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From Expectations to Success: Examining the Relation of Educational Expectations to Educational Attainment for African American and White Adolescents

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From Expectations to Success: Examining the Relation of Educational Expectations to Educational Attainment for African American and White Adolescents

by

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Dissertation

Presented to the Faculty of the Graduate School of

The University of Texas at Austin

In Partial Fulfillment

Of the Requirements

For the Degree of

Doctor of Philosophy

The University of Texas at Austin

December 2008

Dedication

To my Family

Acknowledgments

I would like to express my appreciation to the faculty, family, and friends who have helped me to complete this dissertation. The members of my dissertation committee were important contributors to its final success. Rob Crosnoe provided invaluable insight regarding this area of research in a way that reframed my research questions and conceptual framework. A special note of thanks goes to Su Yeong Kim who made herself available for methodological and analysis consultation and who expressed sincere interest in my research. I also thank Ed Anderson who provided important advice regarding methodological design. Angel Harris offered great insight regarding the theoretical frameworks and data used in this study, and I appreciate his involvement.

An immense amount of gratitude is due to Aletha Huston who has been a dedicated and supportive advisor and mentor. Aletha has challenged my conceptual and analytical thinking at every step of my graduate career in ways that have taught me how to challenge myself. She has offered me invaluable opportunities for professional growth by inviting me to collaborate on exciting research projects with scholars outside of the UT community and by supporting my attendance at research conferences. Her sincere interest in my personal and professional well-being has forever endeared Aletha to me. It has been my honor to know and work with Aletha Huston.

I also gratefully acknowledge Aprile Benner who generously gave her time and advice to assist with analytical and methodological questions. Aprile has been a wonderful friend and mentor.

An important note of appreciation goes to Abby Stewart and David Winter who offered me my first research experiences as an undergraduate and who were instrumental in my transition back to social science research from finance.

To my husband, Kevin, thank you for believing in the importance of my research and making my goals a part of your own. Thank you for identifying ways to help me accomplish my goals before I even realize that I could benefit from your help. Laughing, debating, and enjoying life with you gives me incredible strength and happiness. Above all, I value your love, support, understanding, and friendship.

A very special thank you goes to my daughter, Gracie, for bringing tremendous joy and wonder to my life. Every day that I spend with you is more fun and exciting than the day before. I also want to acknowledge Gracie's patience and perceptive nature, even at age 3. During the final weeks of writing my dissertation, I admit to being more distracted and less creative in play than usual. Grace looked into my eyes and casually observed, "Mom, you are having a hard day." That single comment restored levity and relativity to my being when both had taken a brief holiday.

I also thank my parents. Whether giving support over the phone or flying to Austin to help care for the most precious and amazing person in my life while I keep my professional life in order, you have always been there for me. Your love, support, and encouragement throughout the years have given me tremendous strength.

A note of appreciation goes to my siblings. Michael’s passion in the political arena inspires me to strive for social relevance in my research. Michelle’s anecdotes from

her work as a high school educator have helped me to think about the real world operation of the constructs examined in this study.

I want to thank the great friends that I have made at UT. Chantelle Dowsett, Jessica Thornton Walker, Karen Silcox, Angelica Ware, & Sylvia Epps have been important sources of support either in the classroom or with my research, and all of you have helped me to forget about both!

This accomplishment would not have been possible without the people acknowledged here. I am truly fortunate to have your guidance and support.

From Expectations to Success: Examining the Relation of Educational Expectations to Educational Attainment for African American and White Adolescents

Publication No. _____

Amy Elizabeth Imes, Ph.D.
The University of Texas at Austin, 2008

Supervisor: Aletha C. Huston

Abstract

The primary purpose of this study is to assess the extent to which educational expectations contribute to educational attainment for different subgroups of youth using a model of educational attainment that draws from two theoretical frameworks – status attainment theory and the expectancy-value theory of achievement motivation. This combined model of educational attainment posits that certain factors contribute to attainment, including SES, achievement, self-concept of ability, educational values, and educational expectations. A within-subject fixed-effects approach is used in all of the models tested to address issues of endogeneity. Empirical findings suggest that expectations may not influence attainment for African American youth and youth from low-SES families. In the present study, the relations of expectations for attending college to the amount of education attained are investigated for African American and White youth and for youth from high and low SES backgrounds. Although there is no evidence suggesting that expectations contribute to attainment differently for males and females,

research suggests that the link between achievement and self-concept of ability may differ by gender. Overall, the data support the hypotheses that: a) educational expectations predict educational attainment for each subgroup assessed; and b) educational values and self-concept of ability are precursors of this relation. However, the association between achievement and self-concept of ability is not statistically different for males and females. The results of this study suggest that expectations are important for attainment irrespective of race, socio-economic status, and gender differences. Because such similarities have not previously been reported in the literature, this study makes a unique contribution and may serve as a guide for future investigation.

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Introduction

During a visit to an elementary school serving primarily low-income African American students in the fall of 2006, President George W. Bush asked a group of students who planned to go to college. Nearly every hand rose, and the president proclaimed "that's a good sign" (Tough, 2006). This statement assumes that high expectations for success will unquestionably translate into high performance and attainment. Students who expect to get good grades and go to college will do so, and consequently, the educational gap will close. Many researchers agree that high actual achievement levels inform students' educational expectations and that high expectations lead to higher levels of educational attainment. These contentions are not without merit. Psychological and sociological theory as well as a great deal of empirical research supports these relations (Eccles, 1983; Eccles, Wigfield, & Schiefele, 1999; Ogbu, 1978; Sewell, Haller, & Portes, 1969; Sewell, Haller, & Ohlendorf, 1970); however, recent evidence suggests that these theories and empirical findings may not apply to all students equally. Specifically, the expectations of African American students may not be as strongly linked to achievement and attainment as they are for White students.

The primary purpose of this study is to assess the extent to which educational expectations contribute to educational attainment for African American and White youth. Extant empirical research supports the hypothesis that expectations to obtain higher education contribute to ultimate educational attainment (Eccles, 1983; Eccles et al., 1999; Ogbu, 1978; Sewell et al., 1969; 1970), but there is contradictory evidence regarding the strength of this relation for African American youth. African American youth report

higher educational expectations than White youth, despite the fact that their levels of achievement and attainment are lower than those of White youth, on average (Mello, in press; Hafner, Ingels, Schneider, & Stevenson, 1990; Ingels, Curtin, Kaufman, Alt, & Chen, 2002); this discrepancy suggests that their expectations may not be strongly linked with attainment. Nevertheless, two empirical studies report that educational expectations were a strong and significant predictor of attainment in their samples of African American males, suggesting that individual differences within ethnic groups are meaningful (Portes & Wilson, 1976; Mello, 2007). In the present study, the relations of expectations for attending college to the amount of education attained are investigated. Educational expectations are expected to influence attainment for African Americans as well as they do for Whites, and the link between expectations and attainment is expected to be strong and consistent for males and females and for students from high and low socioeconomic backgrounds.

Two theoretical frameworks – status attainment theory and the expectancy-value theory of motivation – emphasize the influence of expectations on educational outcomes. According to status attainment theory, expectations influence attainment above and beyond the widely acknowledged effects of achievement and socioeconomic status (SES). The theory posits that status is transferred across generations. Youth from higher SES backgrounds have higher educational expectations than those from lower SES backgrounds – even after accounting for achievement – largely because their parents and teachers expect them to go further in school, and that these expectations increase the likelihood that they will obtain advanced education. Using this theoretical approach in a

structural equation modeling framework, I find strong support that expectations contribute to attainment above and beyond SES and achievement and that expectations partially mediate the relations of SES and achievement to attainment.

Using data from the Maryland Adolescent Development in Context Study, I expand upon the basic tenets of the status attainment model by including aspects of expectancy-value theory. As shown in Figure 1, self-concept of ability and educational values are added to the status attainment model a) to determine whether the relation between expectations and attainment remains strong after including additional motivational constructs; b) to assess whether including the constructs improves the model's ability to predict attainment; and c) to gauge whether the two constructs help to explain the process by which achievement influences expectations.

There is evidence that African American youth and youth from more disadvantaged families have higher expectations than are supported by their achievement and attainment levels (Ingels et al., 2002; Mello, in press); therefore,the hypothesized model is compared for African American and white youth, and youth from high and low SES families.

Because African American youth are far more likely to live in socioeconomically disadvantaged families race and SES are often confounded. A goal of this study is to unconfound race and SES by examining potential group differences regarding the relation between expectations and attainment separately by race and SES.

Two definitions of SES were used to assess group differences: a) parent education and b) family income-to-needs ratio. For parent education, youth with parents having a

high school education or less (low parent education) were compared to youth with parents having at least some college (high parent education). Family income-to-needs was calculated using the federal poverty thresholds in 1991 when baseline income and family household size data were collected for this study. Youth from families below 200% of the poverty threshold (low family income-to-needs) were compared to youth from families above 200% of poverty (high family income-to-needs). Third, a multiple-group comparison is performed for gender. Although there is no evidence suggesting that expectations contribute to attainment differently for males and females, there is support that the link between achievement and self-concept of ability differs. Males tend to report a higher self-concept of ability in math than females even though their math achievement levels are lower than for females (Marsh & Yeung, 1998); as a result, the association between achievement and self-concept of ability may be different for males and females, in that achievement may be strongly related to self-concept of ability for females and not males.

The use of a within-subject fixed-effects approach in the current study reduces the likelihood that the observed relations are biased by unmeasured variables. For each of the predictor variables (academic ability, self-concept of ability, educational values, and educational expectations) initial levels are taken into account by regressing the predictors on their corresponding measurements at an earlier time (5^{th} or 7^{th} grade). This procedure corrects for within-subject autocorrelation across time thereby reducing omitted-variable bias and addressing issues of endogeneity that simple OLS regression cannot (Duncan, Magnuson, & Ludwig, 2004).

Second, the causal direction of constructs in the hypothesized model could be incorrect in that some constructs could affect mediators. Three aspects of this study's design address this concern: a) the relations among the constructs in the hypothesized model are strongly guided by theory; b) the longitudinal nature of the data allows for inferences about the direction of effects because constructs measured at earlier ages are more logically seen as predictors of constructs at later ages than the reverse; and c) repeated measures are used to control for and/or assess bi-directional relations (e.g. 7th grade self-concept of ability is modeled as a control variable for achievement, which is a predictor of 8th grade self-concept of ability).

Overall, the data support my hypotheses that: a) educational expectations predict educational attainment; and b) educational values and self-concept of ability are precursors of this relation. Even after accounting for SES, achievement, self-concept of ability, and educational values, expectations continued to be a strong and consistent predictor of attainment. This association did not vary by race, SES, or gender. Because my models accounted for prior academic ability, educational expectations, educational values and self-concept of ability, they remove some of the bias due to endogeneity, providing strong support for both the effect of expectations on attainment and the hypothesized relations among the constructs in this model of educational attainment. The results of this study suggest that expectations are equally important for attainment irrespective of race, socio-economic status, and gender differences. Because such similarities have not previously been reported in the literature, this study makes a unique contribution and may serve as a guide for future investigation.

As contributors to attainment, the factors examined here are SES, achievement, and intrinsic motivational characteristics that are considered at the individual level as opposed to examining how students' external contexts – parents, peers, teachers, schools, and communities – influence these educational outcomes. Extant research based on capital theories (Bourdieu, 1977), bridging multiple worlds theory (Cooper, 2003; Cooper, Cooper, Azmitia, Chavira, & Gullatt, 2002), overlapping spheres of influence (Epstein, 2001), and sociocultural theory (Tharp, 1997) emphasizes how these external environments influence achievement, expectations, and attainment specifically for minority students, but these issues are not the focus of this paper. Rather, the purpose of this paper is to examine the interrelations among these educational constructs while considering the influence of SES.

Theoretical Framework

According to status attainment theory and the expectancy-value theory of achievement motivation, expectations for success are important determinants of educational outcomes. Although the association between expectations for the amount of education attained and the actual level of education attained has been examined empirically for some groups (e.g. white and African American males), there is little empirical evidence to justify generalizing this association for certain subpopulations, including African American youth and youth from varying SES backgrounds.

Many authors (Kao & Tienda, 1998; Garg, Kauppi, Lewko, & Urajnik, 2002; Trusty, 1998; Wilson & Wilson, 1992) assume that expectations influence educational attainment for all students, and they examine the socio-demographic, familial, and

environmental contributors to expectations for many groups. An example of such research findings is that minority parents have high expectations for their children's academic success, which positively influence students' educational expectations for themselves (Romo & Falbo, 1996; Wentzel, 1998). These authors often cite the work of Sewell and colleagues (1969, 1970) who found associations between expectations and attainment using samples of Wisconsin males who were high school seniors. The research community holds this work in high regard, and valuable insight into the antecedents of attainment has been gained as a result of this seminal work. However, as will be discussed further in this paper, the supporting evidence is based on samples drawn over forty years ago that represent a limited demographic group. In fact, these models have not been tested for females or individuals from different SES groups, and the models fit better for White males than for African American males.

In this paper, two theoretical frameworks are used to create a conceptual model of educational attainment (figure 1): status attainment theory and expectancy-value theory of achievement motivation. The first is rooted in a sociological perspective, while the latter is based primarily in a developmental tradition. Both models advocate a strong positive relation between expectations for success and educational outcomes, but differ in two important ways. First, the outcomes assessed by the two models are different. The status attainment model is used to model a process that leads to educational attainment (e.g. number of years of schooling or degree earned), while the expectancy-value framework is used to assess processes that lead to achievement-related behaviors (e.g. persistence at doing well in a course) or choices (e.g. enrolling in a certain course).

Second, the only motivational characteristic considered in status attainment theory is educational expectations, while the expectancy-value model includes other motivational characteristics, such as self-concept of ability and educational values.

Status Attainment Theory

Since its inception and evolution during the late 1950s and 1960s, status attainment theory has been the primary framework used by sociologists to explain educational and occupational attainments. Sewell and colleagues (1969, 1970) pioneered status attainment research with the development of the Wisconsin Model of Educational Attainment, positing that SES is transmitted across generational lines.

Although achievement is considered as an important determinant of expectations and attainment, a major tenet of the theory is that youth from higher SES backgrounds have higher educational expectations than those from lower SES backgrounds – even after accounting for achievement – largely because their parents and teachers expect them to go further in school, and that these expectations increase the likelihood that they will obtain advanced education.

Youth whose parents and teachers encourage them to continue schooling after high school and whose friends plan to go to college are also more likely to expect to go to college than students without those social supports. Academic performance contributes to educational expectations directly through its influence on significant others' beliefs and expectations for students, and parents and teachers are more likely to encourage high achievers to go to college. These socializing agents generally understand that a certain level of academic competence is needed to go to college and earn a degree, and promote

college attendance to students who have demonstrated high academic aptitude. That is, there are multiple paths through which academic achievement has a strong positive influence on expectations.

SES is posited to affect both students' academic performance and the availability of significant others to support educational development. Although definitions of SES vary across studies, SES generally comprises family income, parent education level, and parent occupational prestige. Students from more affluent families generally perform better in school than those from low-income families. The former have greater access to educational opportunities than the latter, including attending high quality preschools and child care centers and having more educational toys and resources in the home that prepare them for formal schooling. Students' family SES also affects the types of parents, teachers, and peers to whom young people are exposed. The authors posit that students interact with individuals of similar SES and that social networks characterized by high SES are more likely to have higher expectations for students than those characterized by low SES. Low SES adults have lower expectations for youth from low SES backgrounds than high SES adults have for youth from more affluent backgrounds. In turn, disadvantaged youth exhibit worse academic performance and receive less educational support from key socializers than do youth from high SES families. Consequently, disadvantaged youth have lower expectations and ultimately attain lower levels of education.

Expectancy-value Theory of Achievement Motivation

Achievement motivation theory is a second framework used to understand the reasons for educational decisions and attainment as well as achievement-related behavior, including academic performance, academic course choice in school, and task persistence. According to expectancy-value theory, expectations for success and education-related values affect educational outcomes. Two areas of research questions addressed using this framework are: a) why some students maintain high educational expectations when it is unlikely that their expectations will be realized; and b) why some students persist at a challenging task while others give up (Eccles et al., 1999).

Achievement motivation theory was first formulated in the 1930s and has since evolved with the contributions of many theorists (see Eccles et al., 1999 for a review of the history). Although Eccles' expectancy-value model is used primarily in this study, Atkinson's theory of motivation is also described as it was an important precursor to Eccles' work. In both theories, achievement motivation is operationalized as achievement-related performance, choices, and behaviors, and is a function of the individual's *expectations* for success and the *value* that the individual attaches to potential outcomes.

Atkinson's expectancy-value model. Atkinson (1964, 1966) posited that achievement-related behaviors were influenced by achievement motives, expectations for success, and incentive values. When individuals find themselves in an achievement situation that requires skill and ability, and believe that their outcome will be evaluated against a standard of excellence, their motivation to expend effort depends on two motives: the disposition to strive for success (M_{as}) and the disposition to avoid failure

(M_{af}). Expectations for success are defined as expected probabilities for success (P_s) and failure (P_f). Incentive values refer to the relative attractiveness of succeeding at a specific achievement task and are conceptualized as the incentive to succeed (I_s) and the incentive to avoid failure (I_f). The combined effect of these motivations, expectancies, and incentives on individual's overall motivation to succeed at a particular task is illustrated algebraically in Equation 1.

Equation 1. $M_{ach} = (M_{as} * P_s * I_s) – (M_{af} * P_f * I_f)$

Atkinson's model has three basic assumptions: a) achievement-related behaviors and situations that are modeled require skill and ability; b) individuals see themselves as responsible for a certain outcome and realize that their final outcomes will be evaluated against a standard of excellence; and c) in any achievement situation, all individuals are motivated to approach success and to avoid failure, although individuals vary in relative strength of one motive over another. The last assumption differentiates Atkinson's model from other expectancy-value theories, including that of Eccles and colleagues, because it considers a personality or individual difference factor along with situational factors (Maehr & Sjogren, 1971).

Atkinson postulated that achievement-oriented individuals (those with a high disposition to strive for success) are more motivated to take on moderately challenging tasks than they are to work at very easy or very challenging tasks. Individuals who fear failure select and work hardest at very easy or very difficult tasks, but are less likely to be motivated on moderately difficult tasks. Maehr and Sjogren (1971) identified and summarized findings from many studies examining this hypothesis. Consistent support is

found only when predicting task choice and persistence behavior; findings are less consistent when performance is examined as an outcome (Maehr & Sjogren, 1971).

Eccles' expectancy-value theory of achievement motivation. Eccles and colleagues (1983, 1998) extended the work of Atkinson and other expectancy-value theories to include social psychological factors that influence expectations for success and subjective task values. According to Eccles' expectancy-value theory of achievement motivation, expectations and task values influence academic performance, task choice, and task persistence. Individuals who expect to succeed at an academic task and who value the consequences of that success will be most likely to expend effort and to make academic choices that will lead to success. This theory can be extrapolated to predict that individuals who expect to graduate from high school and attend post-secondary education and who value having advanced education will be more likely to make choices and engage in behaviors that will lead to high educational attainment.

As direct contributors to academic choices, behavior, and performance, expectations for success and subjective task values have been carefully considered and defined by Eccles and colleagues. Students' expectations for success are based on their confidence in their intellectual abilities and their estimation of task or course difficulty. Expectancies for success refer to how well students believe they will do on an upcoming task, such as how well they expect to do in math next year. Expectancies are formed over time based on the individual's experiences with the subject matter (e.g academic performance) and how he or she interprets those experiences (e.g. "Does the individual

think that her or his successes are a consequence of high ability or lots of hard work?") (Eccles et al., 1999).

Subjective task values refer to the value students place on success at specific tasks or activities (e.g. how important is it to a student to earn a good grade in math the next year or to do well in math generally). There are four components of subjective task values: attainment value, intrinsic value, utility value, and cost. Attainment value represents the importance that an individual places on doing well at something. Students attach importance to tasks that they perceive to be a part of their sense of self. Intrinsic value refers to the enjoyment one experiences as a result of doing a task. Utility value signifies how useful a student perceives a task to be, or the extent to which performing well on a task will contribute to the student's future plans. Cost refers to what a student must give up to perform a task.

Although Eccles and colleagues demonstrate that values contribute to course selection and extracurricular activity enrollment, educational values can also contribute to broader, more macro-level educational outcomes like high school graduation and college enrollment. According to this model, ultimate educational decisions (e.g. graduate from high school, go to college) are based on a series of choices and behaviors along the educational pathway. For example, high school students who want to attend college can choose to enroll in college preparatory courses, which will make them more competitive candidates for acceptance into an institution of higher learning than students who do not take such courses. For these students, utility value is often central to making achievement-related decisions and performing achievement-related behaviors. Many

students value the benefits of having degrees and credentials as opposed to valuing education for education's sake.

Eccles and colleagues contend that expectancies and task values are influenced by social cognitive beliefs, including self-perceived ability, perceptions of task difficulty, goals, and self-schemas (Eccles, 1983; Eccles et al., 1998). Students who believe they are intelligent enough to succeed at a moderately difficult task will persist at the task until completion. These beliefs are influenced by individuals' perceptions of significant others' attitudes and expectations for them, and by their own perceptions of their previous achievement outcomes. Individuals who believe that their parents, teachers, and peers support their academic efforts and who believe they have performed well academically in the past are more likely to believe they can succeed than individuals who do not. For children and adolescents, self-perceived competence in a given domain is equated to their expectances for success (Eccles et al., 1999). Although perceived ability and expectancies are conceptually distinct, the constructs are "highly related and empirically indistinguishable" for young people (Eccles et al., 1999, p. 1025). Individuals' beliefs about socializers' attitudes and expectations and perceptions of past academic performance are influenced by the actual beliefs and behaviors of socializers as well as by their socio-cultural environment. Their interpretations of past academic performance are also shaped by their aptitude, or cognitive ability. Moreover, expectations for success and educational values inform each other reciprocally over time (Eccles et al., 1999).

Many achievement-related choices are domain-specific, including educational and career choices, academic course enrollment selection, and selection of academic majors,

are related to domain-specific values and expectancies for success (Eccles et al., 1998; Wigfield, Tonks, & Eccles, 2004). In this study, expectations for success and educational values are conceptualized at the macro level of long-term educational goals. Students' educational expectations refer to the ultimate level of education students believe they will attain, and their values refer to the overall importance they place on education, or educational attainment. For example, some students expect to graduate from high school and have their formal education finished, and other students expect to go to college and earn a bachelor's degree. Some students believe that having more education will improve their financial and social circumstances; this belief contributes to the value they attach to school. The basic tenets of the expectancy-value theory of achievement motivation are applicable to this conceptualization. Specifically, students' cognitive ability and academic achievement as well as their self-concept of ability are expected to influence their educational expectations and values, which affect their educational outcomes. In this process, I expect youths' educational values to contribute to the amount of education they expect to attain.

Empirical Support for the Expectations-Attainment Relation

Early research on educational expectations and attainment indicated that educational expectations are strongly and positively linked to educational attainment (Portes & Wilson, 1976; Sewell et al., 1969, 1970). Sewell and colleagues (1969) tested the relations hypothesized in status attainment theory on a sample of all high school seniors living in Wisconsin in 1957, who were followed up in 1964 when participants were six years out of high school. For a subset of this sample that included male

participants whose fathers were farmers, the authors reported that educational expectations predicted the level of education attained six years later. Consistent with status attainment theory, students' academic performance, as measured by their class rank, was associated with their educational expectations both directly and indirectly through its relation to influences of significant others (parents' and teachers' encouragement for college and friends' college plans). Once academic performance and significant others' influence were accounted for, SES did not significantly contribute to students' educational expectations.

In a second study, Sewell and colleagues (1970) extended their work to determine whether SES played a role in expectations. They applied a revised model to all males in the Wisconsin sample having data at in both 1957 and 1964 (n=4,388) and tested the generalizability of the model across residential backgrounds. The men were classified according to the size of the community in which they resided while they were seniors in high school -- a farm, a village (population less than 2,500), a small city (2,500 to 25,000), a medium city (25,000 to 100,000), or a large city (more than 100,000). SES was a composite measure that included income, father's occupation, and mother's and father's education. Average SES for each group increased linearly with community size largely as a function of income in that the large city subsample had the highest average income. The model successfully predicted educational attainment for all subgroups. High academic performance contributed to high expectations both independently and through significant others. High educational expectations also predicted educational attainment net of achievement and significant others.

Assuming that expectations would account for the relation of performance to attainment, the authors were surprised to find that academic performance contributed to educational attainment independently of educational expectations. Unexpectedly, SES did not predict academic performance, expectations or attainment. The authors speculated that there was not enough variation in the SES of the sample to detect a significant relation between SES and expectations. It is also possible that any SES effect was accounted for by the influence of significant others on students. Students reported parent and teacher encouragement to go to college as well as friends' college plans to gauge significant-other influence. The association between significant others' influence and academic performance was very strong. Because parent and teacher encouragement and the educational plans of peers are highly related to SES, it is likely that including significant others' influence accounted for the relation of SES to educational expectations.

The findings from these studies have been used extensively to support the commonly-held belief that better academic performance leads to higher educational expectations, and higher expectations lead to greater educational attainment. However, empirical support is limited regarding the generalizability of these findings to other populations (e.g., African American students and females). Participants in the first study had parents with similar occupations and had some similar childhood experiences growing up on a farm. In both studies, participants were white males from Wisconsin. Neither study found support for an effect of SES on attainment, although the authors acknowledged that SES may be confounded with other factors, such as significant others'

influence, which may account for any association of SES with educational expectations and attainment.

Is the expectations-attainment relation different for African Americans?

Although expectations predict attainment for white males, many scholars question the importance of educational expectations for African American students because their expectations are not aligned with their achievement and attainment. Despite exhibiting lower average levels of achievement and educational attainment (Hafner et al., 1990; Ingels et al., 2002), African American students report higher educational expectations than Whites (Kao & Tienda, 1998; MacLeod, 1995; Mello, in press; Mickelson, 1990). Mello (in press) examined the educational expectations of a nationally representative sample (NELS) at five time points from age 14 to 26 by racial and ethnic group (African Americans, American Indian/Alaskan Natives, Asian American/Pacific Islander, European American, and Hispanic). African Americans held the highest expectations at each age, and expectations did not decline linearly with age. Rather, their expectations declined slightly from age 14 to 16, increased to age 20, and declined more substantially by age 26, although the change may not have been substantively meaningful because the average person at every age expected to complete college. At age 26, African Americans' expectations were closer to completing college than just some college, on average. Whites held the third highest educational expectations after Latinos. Although the average level of expectations for Whites was lower than that for African Americans at each time point, the trajectory of expectations across age was similar, and Whites expected to complete college, on average. However, not all studies indicate that African

Americans' expectations are higher than those of whites. Using data from the Maryland Adolescent Development in Context Study (MADICS; also the data used in this dissertation), Harris (2006) reports that the educational expectations of African Americans and Whites are not statistically different after accounting for SES.

The generalizability of Mello's findings to all African Americans is limited because these analyses excluded individuals who dropped out of high school and included only those participants with average academic achievement. If dropouts and low achievers were included, average expectations would probably be significantly lower at each time, especially at ages 18, 20, and 26. Because African Americans are more likely than Whites to be low achievers or to drop out, the sample of average achievers is probably more biased for African Americans than for Whites. The persistently high expectations of African Americans in Mello's study contradict the findings that a) expectations generally decline as students progress through high school (Mare & Winship, 1988; MacLeod, 1995); and b) African Americans in late adolescence and early adulthood have realistic educational expectations (Hanson, 1994; Trusty & Harris, 1999).

By senior year of high school students are typically expected to know if they are going to graduate from high school and whether or not they will be continuing their education at a postsecondary institution (Hanson, 1994; Trusty & Harris, 1999). For these students, educational expectations are analogous to educational plans for the future. If students have not applied for college or been accepted, then they do not expect to go to college, at least not directly after high school. Younger students do not have such concrete plans, so there is more flexibility for younger students to have inflated

expectations. Mello's findings suggest this trajectory cannot be applied to African Americans, at least not through age 26, for whom average expectations are stable.

Two studies test the applicability of the status attainment model for African American students. Portes and Wilson (1976) report that educational expectations for success and confidence in one's abilities are more important determinants of attainment than is achievement for African Americans. In fact, achievement did not predict attainment for African Americans in the sample used, although it was a significant predictor for White students. In a national sample of over 1600 young African American and White men, information regarding the SES of the students' families and their academic performance (GPA) was first collected in 1966 when the young men were in tenth grade. Their educational expectations were assessed during the second data collection in 1968 (senior year) by having students report their educational plans ranging from dropping out of high school to attending graduate or professional school. It is important to note that this sample is biased toward higher performing students because students who had dropped out of school prior to data collection in their senior year are not included. Sample members were then asked about their actual level of educational attainment two years post high school in 1970 ranging from "dropped out of high school" to "attended university." The authors reported important differences in the links among academic performance, educational expectations, and educational attainment for African Americans and Whites. First, academic performance significantly predicted educational attainment for Whites, but not for African Americans. Second, academic performance was a significant predictor of expectations for both groups, but the relation was much

stronger for Whites than for African Americans. Third, educational expectations were linked to attainment for both groups, but the relation was stronger for African Americans. Fourth, self-esteem was also an important contributor to attainment for African Americans, but not for Whites.

These findings indicate that academic performance is an important determinant of attainment for Whites, but expectations for success and confidence in one's abilities are stronger predictors of attainment for African Americans. An important caveat to this conclusion is that the findings might have been different if educational attainment had been measured later. Individuals' educational circumstances two years after high school may not be an accurate index of their ultimate educational attainment. White students may transition to postsecondary institutions more quickly than African American students after high school, and more African Americans may have returned to school after the last data collection period; because African American youth are more likely to come from low SES families they may be more likely than Whites to begin working after high school instead of going straight to college to accumulate enough resources to pursue postsecondary education later. As stated previously, another limitation of these findings is that early high school dropouts were not included.

The authors also examined the influence of SES on expectations and attainment for both groups, and reported a stronger link for Whites than for African Americans, suggesting that SES is not a significant contributor to these outcomes for African Americans. The definition of SES comprised father's occupational status, father's education, mother's education, possessions in the home, number of books in the home

and number of rooms per persons in the home, but did not include a measure of income. The conclusion from these findings was that educational expectations are strong predictors of attainment regardless of SES for African American males.

In more recent research, the educational expectations of African American males also predicted later educational attainment. Using NELS:88 data, Mello (2007) reports that African American males' expectations in eighth-grade predicted educational attainment eight years out of high school after accounting for eighth-grade achievement; however, it is not reported whether achievement was directly related to expectations or attainment. The findings of Mello (2007) and Portes and Wilson (1976) suggest that expectations, self-confidence, and other indicators of optimism may be influential determinants of attainment for African Americans, even if those beliefs are not aligned with academic achievement.

Is the expectations-attainment relation different for students from varying SES backgrounds?

Previous research shows that SES is strongly and positively linked to achievement, educational expectations, and educational attainment (Brantlinger, 1992; Hafner et al., 1990; Hanson & Ginsburg, 1988; Ingels et al., 2002; Mello, in press). Youth from low-SES families are less likely to graduate from high school or earn advanced degrees than students from more affluent families (Ingels et al., 2002). Disadvantaged youth also report lower educational expectations than their more affluent counterparts and are more likely to expect only to graduate from high school and are less likely to expect to complete college compared to students from higher SES families

(Mello, in press). In accordance with these lower expectations, low-SES students also have lower levels of educational attainment than their more affluent counterparts, implying that the educational expectations of low-SES students are realistic because their expectations, achievement, and attainment are all lower than students from more affluent families. However, this simple comparison of higher versus lower educational outcomes does not prove that their expectations are realistic. Expectations may be significantly lower than those of more affluent students in a statistical sense, but remain high. Because SES influences achievement and attainment, and may affect the associations of educational expectations to these educational outcomes, models that examine the relations among these constructs should also include SES as a moderator of process as well as a predictor.

Another important concern about these conclusions is that they are not consistent with what we know about African Americans who are disproportionately represented in low SES families. Despite the fact that African Americans are more likely to be poor than Whites, their educational expectations are relatively high compared to the low expectations of low-SES students (Mello, in press). To separate the effects of SES and race on educational attainment and the processes that influence attainment, it is important to examine the link between expectations and attainment separately for African American and White youth and for youth from varying SES backgrounds.

How do the determinants of educational attainment differ by gender?

In the previous two sections, differences in the association between educational expectations and educational attainment were examined by race and SES. Although there

is no empirical evidence to suggest that this relation differs by gender, there may be gender differences in the way achievement informs self-concept of ability. As posited by the expectancy value theory of achievement motivation, such motivational characteristics as self-concept of ability are strongly related to educational outcomes. In particular, a positive self-concept is strongly related to achievement and motivation (Byrne & Gavin, 1996; Marsh & Yeung, 1997), and is believed to promote achievement-related choices and behaviors (Marsh & Craven, 1997); Sax (1994) argues for the importance of understanding gender differences in the ways self-concept relates to achievement because gender differences in self-concept of ability may lead to gender differences in achievement and motivation.

A large body of research has been dedicated to the study of average gender differences in self-concept of ability, and empirical findings indicate that the association between achievement and self-concept of ability may differ for males and females (Marsh & Yeung, 1997). Females report higher self-concepts of ability in English than males, and males report higher self-concepts in math than females, on average (Eccles, 1983; 1987). Many scholars have hypothesized that gender stereotypes may result in different socialization for girls and boys that may fail to reinforce a positive self-concept in mathematics among girls and in reading and language among boys (Maccoby, 1966; Maccoby & Jacklin, 1974; Marsh, 1989). Marsh (1989) explains that girls have higher verbal than mathematics self-concept and that boys have higher mathematics than verbal self-concept, and according to this belief, predicts that gender differences in these

domain-specific self-concepts are larger than can be explained by differences in achievement (Marsh, 1989).

To examine this hypothesis, Marsh and Yeung (1998) examined the association between achievement and self-concept of ability for boys and girls. Domain-specific constructs were considered in that English achievement was expected to be related to English self-concept, and math achievement was expected to relate to math self-concept. Although the associations between achievement and self-concept for each domain were not significantly different for boys and girls, the authors indicated that females reported a lower self-concept of ability in math than did males despite the fact that females had higher math achievement (Marsh & Yeung, 1998). This finding highlights a potential gender difference in the way self-concept of ability and achievement influence each other, which should be considered in models of educational attainment that include these constructs.

The Present Study

Theory and empirical research suggest that educational expectations influence attainment. There is evidence that suggests the educational expectations of African American youth and youth from socioeconomically disadvantaged families are not aligned with educational attainment. Although the relation of expectations to attainment has been examined for White and African American males, it has not been assessed for all African Americans or for youth from varying SES backgrounds. Few, if any, empirical studies have controlled the effects of earlier educational expectations to address issues of endogeneity.

The overarching question driving this research is whether educational expectations contribute to educational attainment above and beyond the influence of SES and achievement, and whether this is true for African American youth and youth from low SES families. The conceptual model presented in this study is based in status attainment theory and is enhanced by motivational components of the expectancy-value theory of achievement motivation (Figure 1). According to the conceptual model of educational attainment in this study, SES and achievement have direct effects on both attainment and expectations, and expectations are hypothesized to influence attainment above and beyond the effects of achievement and SES.

Expanding upon the primary components of status attainment theory, two motivational constructs emphasized in expectancy-value theory – self-concept of ability and educational values – are added to the model to determine whether including these aspects of motivation: a) reduces the magnitude of the association between expectations and attainment; b) contributes to a better description of attainment; and c) partially explains the process by which achievement affects expectations. In particular, the addition of these constructs leads to a more comprehensive picture of students' educational development and potentially stronger conclusions about the association between expectations and attainment if it holds after accounting for SES, achievement, self-concept of ability, and values. Moreover, achievement may influence expectations directly and indirectly through self-concept of ability and educational values.

In this conceptual model, attainment is influenced directly by educational expectations, SES, achievement, and educational values. Students with higher SES

backgrounds, stronger academic performance, more positive educational values, and higher expectations for educational attainment are expected to attain more post-secondary schooling than their respective counterparts. A second hypothesis is that the process by which achievement influences expectations is expected to be partially explained by self-concept of ability and educational values. Self-concept of ability is expected to be an accurate reflection of actual achievement, and students who believe they are good at school are more likely to value education and expect to attain more education than students who doubt their academic ability.

To examine whether expectations contribute to attainment for African American youth and youth from low SES families, the conceptual model is tested for group differences by race and SES. Because prior research suggests the association between achievement and self-concept of ability may differ by gender, model differences for males and females are also assessed.

There are several strengths of the current study that reinforce the validity of its findings. First, the conceptual model is tested for group differences by race and SES in an attempt to separate the often confounded effects of race and SES on educational outcomes. Second, the longitudinal, within-subjects fixed-effects design of this study is used to address problems of endogeneity. Using a within-subject fixed-effects approach reduces the likelihood that the observed associations are biased by unmeasured variables. The models tested take into account initial levels for each of the predictor variables (achievement, self-concept of ability, educational values, and educational expectations) by regressing each predictor on its corresponding measurement at an earlier time (7^{th}

grade). This procedure corrects for within-subject autocorrelation across time and reduces omitted-variable bias (Duncan, Magnuson, & Ludwig, 2004). Third, educational expectations in 11th grade are used to predict attainment three years post high school; this is a point in time at which adolescents should be relatively certain about their educational plans, which allows for more realistic expectations than in earlier grades. Finally, this model is guided by strong theoretical frameworks that have been supported in large bodies of empirical work.

Using data from the Maryland Adolescent Development in Context Study (MADICS), the following research questions are addressed:

Research Question 1. Do educational expectations contribute to attainment above and beyond SES and achievement?

Research Question 2. What is gained by adding self-concept of ability and educational values to status attainment theory?

Research Question 3. Does the hypothesized model of educational attainment differ for African American and White youth?

Research Question 4. Does the hypothesized model of educational attainment differ for youth from high and low SES families?

Research Question 5. Does the hypothesized model of educational attainment differ for males and females?

Method

Sample

Data from the Maryland Adolescent Development Study in Context Study (MADICS) is used to examine the educational development of African American and White adolescents from varying socioeconomic backgrounds. The sample is drawn from a county on the Eastern seaboard of the U.S. that consists of several different ecological settings, including low income, high risk urban neighborhoods, middle class suburban neighborhoods, and rural, farm-based neighborhoods. It includes 1,482 families with approximately equal numbers of males and females (51% male and 49% female), 61% of whom are African American. The range of pretax family incomes in 1990 is $5,000-$75,000 (normally distributed) with a mean $45,000-$49,000. Hence, there is sufficient variability to provide information about the educational trajectories of youth across the socioeconomic spectrum.

The MADICS dataset includes information collected at six waves. The first four waves were conducted during adolescents' middle and high school years (during 7th, 8th, and 11th grades), and include data collected from school records, youth telephone and in-home interviews, and self-administered questionnaires by youth. The last two waves were conducted when the youth were one and three years removed from high school, and the youth completed only self-administered questionnaires at these times. For the purposes of this study, the school records and self-administered questionnaires completed by the youth and parents are used to examine the relations among SES, achievement, self-concept of ability, values, expectations, and attainment, and to determine whether those relations are moderated by certain youth characteristics.

Although MADICS data are not nationally representative, the model of educational attainment assessed in this study is firmly based in theory and the relations among model constructs are not expected to vary by geographic location in the United States. A strong advantage of using MADICS data that compensates for its non-representativeness is that the data are longitudinal and include repeated measures across time.

Measures

A summary of the measures used in this study is presented in Table 1; the summary includes all items comprising the constructs, the wave at which each measure is assessed, the source providing the information, and the scale used by the reporter.

SES. Family SES is assessed using four indicators: family income, parent education, parent occupation, and marital status. Family income is based on total family income before taxes when adolescents were in the 7th grade (1=less than 5,000 dollars; 16=greater than 75,000 dollars). An increment of 1 across the scale represents an increase in family income of 5,000 dollars. To assess parent education, parents responded to the question "What is the highest grade of school you have completed?" Responses were coded as follows: for each grade before high school graduation the grade level number was used as an identifier (e.g. 8th grade = 8); 12=finished high school or earned a GED; 13=some college; 14=associates degree; 15=higher education that is not college (e.g. LPN, RN); 16=bachelor's degree; 18=master's degree; 20=doctorate, M.D. etc. Parent occupation is based on the following question: "What is your main occupation?" This question was initially coded using the U.S. Census Bureau's Occupational Classification

System from the 1980 census. Unique categories for about 900 occupations are included in the coding system. This question was coded by employees of the MADICS project, and inter-rater reliability was 90% or greater for all coders based on approximately 200 parent responses. The first three family characteristics have been used extensively in the literature to define SES. I also include marital status because households with married parents are more affluent, on average, than households led by single parents (Bradley & Corwyn, 2002; Brooks-Gunn & Duncan, 1997).

Achievement. Students' level of achievement is assessed using school records data. Students' scores in math, science, and English during the 7th and 8th grades are used as distinct indicators of students' academic performance in middle school. Each course grade is measured on a 5-point scale (1=E; 5=A).

Self-concept of ability. Students reported on their level of ability when they were in the 7^{th} and 8^{th} grades. At each time of assessment, students indicated their level of ability (1= not good at all; 5= very good) in two domains: a) math; and b) other school subjects. The two items are used as indicators for self-concept of ability.

Educational values. Educational values were measured in 7th and 11th grades. In the 11^{th} grade, students responded to seven items intended to gauge the value they place on education (1=strongly agree; 5=strongly disagree). Examples of these items include: a) I have to do well in school if I want to be a success in life; b) school is a waste of time; and c) education really pays off in the future for people like me. Four items were reverse coded so that high scores indicated high educational values and low scores referred to low values (1=strongly disagree; 5=strongly agree). In 7^{th} grade, seven items were asked

to assess values, four of which were also asked in 11th grade. Four items were reverse coded so that high scores indicated high educational values and low scores referred to low values.

Educational expectations. Students reported their level of educational expectations in the 7th and 11th grades by responding to the following question: "How far do you think you actually will go in school?" The lower end of the response categories was slightly different at 7th (1=8th grade or less; 9= J.D., Ph.D., M.D.) and 11th grades (1=11th grade or less; 8= J.D., Ph.D., M.D.).

Educational attainment. Three years after high school ended, adolescents reported their current level of educational attainment by responding to the following question: What is the highest grade of school you have completed? (1=less than a high school diploma; 2 = high school diploma or GED; 3= 1-2 years of vocational training post High School; 4 = 1 year of college or less; 5 = 2 years of college; 6 = associate's degree; 7 = 3 to 4 years of college; 8 = bachelor's degree or higher).

Covariates. Certain family and youth characteristics that may influence the components of the hypothesized model and their interrelations are included in the analysis to diminish their effect on the relations among the constructs of interest: academic ability (5th grade standardized achievement test score), family size (number of persons in the household), race, and gender. When racial/ethnic status or gender is examined as moderators they are not included as covariates.

Analysis Plan

The main goals of this study are to understand the extent to which educational expectations contribute to educational attainment, and whether the association between expectations and attainment varies for African American youth and youth from low SES families when compared to White youth and youth form high SES families, respectively. Structural equation modeling was used to test the hypothesized models of educational attainment using Mplus Version 5. These models are designed to provide compelling evidence about the contribution of educational expectations to attainment. In particular, prior levels of the predictors, including 7th grade measures of expectations, self-concept of ability, and values are statistically controlled to minimize problems of omitted variable bias (e.g. the effects of prior family, peer, and school experiences). By controlling for initial levels of these constructs, the residual change in each predictor, rather than the absolute level of each predictor, is being modeled (e.g. the change in expectations from 7^{th} to 11^{th} grade is examined as a predictor of attainment three years after high school).

The research questions and analyses described below are informed by the conceptual model in Figure 1. Descriptive information (correlations, means, and standard deviations) for the observed variables is presented in Tables 2 and 3. This information is also provided for African Americans and Whites, for students from varying SES backgrounds as defined by parent education and family income-to-needs, and for males and females in Appendix A, Tables 1-8.

Correlations. The intercorrelations among constructs in the hypothesized model are examined to provide a basis for further analysis. At the level of the zero-order correlations, the indicators within the latent constructs are strongly and positively

associated with each other. The correlations also show that all of the indicators in the hypothesized model are strongly related to educational attainment. In particular, the correlation between 11th grade expectations and attainment is very high at .50 for the full sample. Intercorrelations are also assessed within each subgroup as an initial indication of whether the model constructs are related in the expected ways for each of the groups (Tables A1-A4).

Mean differences. Although mean differences are not considered when assessing the associations among the constructs in the hypothesized model, mean differences in achievement, expectations, and attainment among African American and White youth and among youth from high and low SES backgrounds are cited as reasons why expectations may not influence attainment for African American youth and youth from low SES families. Therefore, mean differences for all of the study variables are assessed and discussed by subgroup (Tables A5-A8).

Missing Data. As shown in Table 2, there are varying amounts of missing data across the variables examined. The most dramatic increase in missing data occurred in the transition from the 7th to the 8th grade. Full information maximum likelihood (FIML) estimation is used to estimate missing data for the parameters in the SEM models (Muthen & Muthen, 2007). FIML estimation fits a covariance structure model to the observed data for each participant rather than deleting persons with missing data. FIML estimation is accepted as the most efficient and least biased way of analyzing data with cases that are missing completely or randomly (McDonald & Ho, 2002).

Non-independence. Adolescents are nested in schools and students who attended the same schools share same school characteristics, including student body SES, access to the same teacher instruction, and other school-wide practices and opportunities. Non-independence can result in incorrect standard error estimates that increase type 1 error. Standard error estimates are corrected by using the "cluster" command in MPlus.

Models of educational attainment. To test the hypothesis that educational expectations contribute to attainment independently of SES and achievement, a series of structural equation models are performed based on the hypothesized model in Figure 1. Four steps of analysis are conducted to address the research questions above. First, confirmatory factor analysis (CFA) is used to assess the strength of the measurement model, or the extent to which the proposed items represent their respective constructs.

Second, to assess the degree to which expectations contribute to attainment, a reduced model is examined by testing the associations among four critical aspects of students' educational development: SES, academic achievement, educational expectations, and educational attainment. Few dispute that SES and achievement are strongly linked to educational attainment, and the goal here is to test the expectations-attainment relation after these factors are taken into account. Mediational tests within SEM are also conducted to determine whether expectations partially mediate the association between SES and attainment.

Third, two motivational constructs – self-concept of ability and educational values – are incorporated into the model resulting in the full conceptual model in Figure 1. This model is tested to determine whether: a) the relation of expectations to attainment holds

after these two psychological contributors to educational attainment are added; b) including self-concept and values improves the ability of the model to explain attainment; and c) whether self-concept and values partially explain the process by which achievement influences expectations.

Finally, multiple-group comparisons are conducted to determine whether expectations predict attainment similarly for African American and White youth and youth from low and high SES families. To determine whether the association between achievement and self-concept of ability differs for males and females, a multiple-group comparison by gender is also performed. More detail for each analysis is described in the results section.

Issues of endogeneity, or selection effects, should always be addressed when analyzing nonexperimental data. First, associations among the constructs in the model could be affected by third variables that are not included in the analysis leading to biased estimates of the relations in the models. Although various family and youth characteristics are controlled in the analyses, unmeasured omitted variables (e.g. family and school experiences) could still produce bias in the path coefficients. The use of a within-subject fixed-effects approach in the current study reduces the likelihood that the observed relations are biased by unmeasured variables. For each of the predictor variables (achievement, self-concept of ability, educational values, and educational expectations) initial levels are taken into account by regressing the predictors on their corresponding measurements at an earlier time (7th grade). This procedure corrects for within-subject autocorrelation across time thereby reducing omitted-variable bias and

addressing issues of endogeneity that simple OLS regression cannot (Duncan, Magnuson, & Ludwig, 2004).

Second, the causal direction of constructs in the hypothesized model could be incorrect in that some constructs could affect mediators. Three aspects of this study's design address this concern: a) the relations among the constructs in the hypothesized model are strongly guided by theory; b) the longitudinal nature of the data allows for inferences about the direction of effects because constructs measured at earlier ages are more logically seen as predictors of constructs at later ages than the reverse; and c) repeated measures are used to control for and/or assess bi-directional relations (e.g. 7th grade self-concept of ability is modeled as a control variable for achievement, which predicts 8th grade self-concept of ability).

Goodness-of-fit. To assess how well the proposed models fit the data, four fit indices were used. The chi-square statistic, which assesses the difference between the observed covariance matrix and that of the hypothesized model, is presented as it is commonly reported in studies using structural equation techniques and is used to generate many other fit indices; however, the chi-square statistic is highly sensitive to sample size and cannot be relied upon to assess model fit alone. Consequently, I also report the root mean square error of approximation (RMSEA), Comparative Fit Index (CFI) and the Standardized Root Mean Residual (SRMR). The RMSEA compensates for model complexity (Arbuckle & Wothke, 1995). Unlike the model chi-square and other indices of model fit, the RMSEA does not assume that the hypothesized model is a perfect fit to the data. Rather, RMSEA includes a noncentrality parameter that gauges the degree to

which the null hypothesis is false. This index of model fit is also unique in that it accounts for the error of approximation, which is the degree to which the hypothesized model does not fit the population covariance matrix as a source of poor model fit. RMSEA values less than .06 are good indicators that the hypothesized model fit the data (Hu & Bentler, 1999). The CFI tests the relative improvement in model fit by comparing the fit of the hypothesized model to that of an independence model, which assumes that observed variables in the model are not at all related. Specifically, the chi-square statistic associated with the hypothesized model (from which the CFI is calculated) is expected to be significantly lower than that of the independence model suggesting that the hypothesized model is a better representation of the data than the independence model. A CFI value greater than .95 is considered to indicate a reasonably good fit to the data (Hu & Bentler, 1999). A drawback of this fit index is that the validity of the hypothesized model is based on its comparison to a model that is almost always unrealistic (i.e. one in which the variables have no relation to each other). The SRMR assesses differences in the observed correlation matrix and the correlation matrix of the hypothesized model. A value of zero indicates that the model fits the data perfectly; however, values less than .10 are generally accepted as indicators that the hypothesized model fits the data (Hu & Bentler, 1999).

Standardized coefficients are provided in the figures to ease interpretation of the relations among the indicators and constructs. Note that in constrained models where paths are held constant across subgroups only the unstandardized coefficients are identical for groups (see Table 4 for unstandardized coefficients). Although the

standardized estimates are similar across groups they are not identical because the standard errors used to calculate these estimates are not constrained to be equal across groups.

Results

Structural equation modeling is used to address the research questions in this study. First, the underlying measurement model and the extent to which the proposed indicators represent their respective constructs are described. Then, the structural model is described. Finally, study results are presented by research question.

Measurement model

CFA is used to test how well the observed variables relate to each other and collectively represent their respective constructs (results shown in Figure 2). For a description of the indicators used to represent the model constructs refer to Table 1. For SES, the indicators are tested as reflective indicators rather than as causal because SES is caused by education, income, occupation, and marital status, as opposed to SES being the cause of these characteristics (Kline, 2005). Although the entire measurement model can be tested for the full sample, it is prohibitively complex in terms of the number of latent constructs when conducting multiple-group comparisons. Therefore, two separate measurement models are tested: a) SES, achievement, 8^{th} grade self-concept of ability, and 11^{th} grade educational values (Model 1: Chi-square (df) = 498.782 (137); CFI = .944; RMSEA = .043; and SRMR = .039); and b) 7^{th} grade self-concept of ability and 7^{th} grade educational values (Model 2: Chi-square (df) = 129.852 (26); CFI = .906; RMSEA = .053; and SRMR = .039). As shown in Figure 2, all of the indicators loaded positively

and significantly on their respective latent constructs, and the proposed measurement model fit the data well indicating that the empirical relations among the variables are strong enough to form the latent constructs.

Because model equivalence for the structural model is tested for certain subgroups, the two measurement models are tested for equivalence across subgroups separately for each multiple-group comparison (i.e. African American and White youth, youth whose parents have low and high education, youth from families with low and high income-to-needs ratios, males and females). To test measurement model equivalence for each of the subgroups, two models are compared: one in which all paths were allowed to vary across the two subgroups; and another in which all paths were constrained to be equal for the two groups. The results of these comparisons are shown in Figures 1-4 of Appendix B.

For African American and White youth, the fully constrained model for model 1 did not fit the data significantly worse than the corresponding baseline model so all paths are found to be similar for both groups. In contrast, the fully constrained model for model 2 (self-concept of ability and educational values in 7^{th} grade) fit the data significantly worse than the corresponding baseline model. The fully constrained model is modified by allowing the factor loading of the indicator "The school teaches me things that my family wants me to learn" on 7^{th} grade educational values to vary for the two subgroups (the loading for White youth is .25 compared to .47 for African American youth).

For the remaining subgroups (youth whose parents had low versus high education; youth from families with low versus high income-to-needs ratios; males and

females), the fully constrained models do not fit the data significantly worse than their respective baseline models. Therefore, the fully constrained measurement models are retained.

Structural model

The structural model represents the hypothesized relations among the latent factors and observed indicators in each of the models of educational attainment tested. To determine whether the hypothesized models are supported by the data, the goodness-of-fit indicators described previously are relied upon. Moreover, the path coefficients for the hypothesized relations are examined to ensure that all associations are strong and in the expected direction. The amount of variance explained for educational attainment is also considered to determine how well the proposed models describe educational attainment.

Research Question 1. Do educational expectations contribute to attainment above and beyond SES and achievement?

A major tenet of status attainment theory is that educational expectations are an independent contributor to attainment. Three analyses are conducted to test this assertion: a) the model of educational attainment in Figure 3 (drawn from status attainment theory) is tested to determine the hypothesized relations among SES, achievement, expectations, and attainment; b) the amount of variability in educational attainment that is explained by two separate models – the model in Figure 3 and a reduced model that does not include educational expectations – are compared to assess whether adding expectations to the reduced model improves the amount of variance in attainment explained; and c)

expectations are tested as a mediator of the association between SES and attainment to determine whether the direct association between SES and attainment should be retained.

Status attainment model. To determine how well expectations predict attainment in the status attainment model, a model that includes direct paths from SES and achievement to attainment as well as partially mediated paths through expectations was tested (Figure 3). The model fit the data well (CFI = .970, RMSEA = .036, SRMR = .028, χ^2 (80) = 229.411, p < .0001). Even with SES and achievement included in the model, the link between expectations and attainment remains strong and statistically significant, indicating that expectations are an important contributor to educational attainment.

Amount of variance explained. As another test of the degree to which expectations predict attainment, I compared the amount of variance explained in educational attainment in the model in Figure 3 to the amount of variance explained in a model that does not include educational expectations. When expectations are included in the model, there is a five percent increase in the amount of variance explained compared to when only SES and achievement are in the model (R^2 = .41).

Expectations as a mediator. Educational expectations are assessed as a mediator of the relation between SES and attainment to determine whether the direct association between SES and attainment should be retained in later models; achievement is included in the model as a covariate as it is a widely-accepted contributor to attainment. To test whether expectations mediate the relation between SES and attainment, the three-model procedure for testing mediation in SEM is used (Baron & Kenny, 1986; Holmbeck, 1997; for another example of this method, see Gershoff, Aber, Raver, and Lennon, 2007). The

models are presented in Appendix C. The first step in this procedure is to examine the direct relation between the independent (IV) and dependent (DV) variables of interest. The second step is to test a mediational model in which the IV and the mediator (M) relate to the DV. If the models from steps 1 and 2 are both significant, then a third step is performed that compares the fit of two IV → M → DV meditational models: one in which the IV → DV relation is constrained to zero and one in which it is unconstrained. If model fit is better for the constrained model than for the unconstrained model, then full mediation is supported; however, if the unconstrained model fit is better, then only partial mediation exists (Holmbeck, 1997). The Satorra-Bentler adjusted chi-square difference test was used to assess change in model fit because the MLR estimator was used to handle missing data in MPlus.

The first step of mediation testing is a reduced model that included only the relation of SES to attainment, CFI = .971, RMSEA = .039, SRMR = .025, χ^2 (62) = 195.819, p < .0001. In step 2, expectations is tested as a mediator of the SES to attainment link while retaining the direct association of SES to attainment, CFI = .953, RMSEA = .046; SRMR = .060, χ2 (82) = 321.708, p<.0001. Because all of the paths in steps one and two were significant at the p<.0001 level, step 3 is conducted as a test of partial versus full mediation. For step three, the same model as in step 2 is tested, but the path from SES to attainment is constrained to be zero (CFI = .948; RMSEA = .047; SRMR = .064; χ2 (83) = 343.156, p < .0001). The constrained model fit the data significantly worse than did the unconstrained model from step 2, $\chi^2_{\text{difference}}$ (1) = 22.601, p < .0001, indicating that expectations partially mediate the relation of SES to

expectations. Thus, SES relates to attainment both directly and indirectly via educational expectations. The analysis supports the hypothesis that expectations are a partial mediator of the SES-attainment association.

Research Question 2. What is gained by adding self-concept of ability and educational values to the status attainment model?

Adding self-concept of ability and educational values to the status attainment model might improve the more parsimonious model in two ways: a) adding the two constructs to the model could improve the precision of the estimation of educational attainment in terms of the amount of variance explained in attainment; and/or b) adding the two constructs could better explain the pathways by which SES, achievement, and expectations lead to attainment.

Hypothesized model. Self-concept of ability and educational values are added to the model shown in Figure 3, and the revised model fits the data well (CFI = .935, RMSEA = .031, SRMR = .042, $\chi 2$ (485) = 1161.548 $p < .0001$; see Figure 4). The paths among model constructs are strong and significant; SES and achievement are linked to higher levels of educational attainment, and these relations are partially explained by their indirect relations through self-concept of ability, educational values, and expectations. The results of this analysis support the validity of the hypothesized model for the full sample. These findings also provide further evidence that educational expectations contribute to educational attainment, as the association between the two remains strong and significant (the standardized path coefficient falls by .06) even after

accounting for SES, achievement, earlier expectations (7^{th} grade), self-concept of ability, and educational values.

Amount of variance explained. The first method used to evaluate the contribution of these two constructs to the model is to compare the amount of variation in educational attainment that is explained by the two competing models. Because $R^2 = .46$ for both models, it is concluded that the model with self-concept and values does not explain more of the variability in educational attainment than the model without these constructs. However, it is possible that adding these constructs to the model improves our understanding of the ways in which achievement lead to expectations. To assess whether including self-concept of ability and educational values provides an explanation of the pathways by which achievement leads to expectations a test of mediation is conducted.

Self-concept of ability and educational values as mediators. A series of reduced models is used to assess whether self-concept of ability and educational values together partially mediate the association between achievement and expectations (figures shown in Appendix D). For step one, expectations were regressed on achievement (CFI = .962, RMSEA = .044, SRMR = .028, χ^2 (56) = 207.570, p<.0001). In step two, expectations were regressed on achievement, self-concept ability, and educational values allowing self-concept of ability and values to partially mediate the achievement-expectations link (CFI = .929, RMSEA = .035, SRMR = .043, χ2 (359) = 981.764, p<.0001). For the final step, the model in step 2 was modified so that the direct link from achievement to expectations was constrained to zero (CFI = .927, RMSEA = .036, SRMR = .044, χ2 (360) = 1000.588, p<.0001). The constrained model fit the data significantly more poorly

than the model in which the path from achievement to expectations was estimated ($\chi^2_{difference}$ (1) = 17.317, p < .001) suggesting that self-concept of ability and educational values partially mediate the achievement-expectations association, but that the direct link between achievement and expectations should be retained in the model. Although model 2 does not add to the amount of variance explained in attainment, it does appear to provide added information about important pathways by which achievement influences expectations so they will be included in subsequent tests.

Research Question 3. Does the hypothesized model of educational attainment differ for African American and White youth?

To test the hypothesis that educational expectations contribute to attainment for African American and White youth, a multiple-group comparison of the model of educational attainment shown in Figure 4 was conducted (results shown in Figure 5). Model equivalence for African American and White youth was assessed by comparing two models: a) a model with the structural paths constrained to be equal for the two subgroups (constrained model); and a model allowing the paths to vary across the two groups (baseline model). This analysis tests whether the structural process differs by subgroup (Byrne, 2001; Kline, 2007). If the constrained model fits significantly worse than the baseline model, then one must conclude that the process is not equivalent for the subgroups and continue by assessing which paths are different for the subgroups in question. The baseline (CFI = .924, RMSEA = .034, SRMR = .051, χ^2 (949) = 1735.418, p < .001) and constrained (CFI = .923, RMSEA = .034, SRMR = .054, χ^2 (982) = 1777.854, p < .001) both models fit the data well, and the constrained model was not

significantly worse than the baseline model ($\chi^2_{\text{difference}}$ (33) = 36.176). According to this omnibus test, the model applies equally well for African American and White youth.

As a robustness check to ensure that there are no group differences that were missed by the omnibus test, the full model was tested separately for African Americans and Whites (see Figure E1). In these models, two paths appear to be different for African American and White youth: a) educational values to attainment; and b) SES to attainment. Educational values are a strong and significant predictor of attainment for Whites (b= .28, p < .001), but not for African Americans (b = .03, ns). The link from SES to attainment is strong and significant for African Americans (b= .18, p < .001) and not for Whites (b = .09, ns). To follow-up these results, the constrained model above is compared with two modified versions of the constrained model. First, the path from educational values to attainment is allowed to vary across race (ΔCFI = +.001, ΔRMSEA = 0, ΔSRMR = +.001, $\chi^2_{\text{difference}}$ (1) =6.456, p<.01); this modified constrained model indicates improved fit over the fully constrained model. Second, the path from SES to attainment is allowed to vary across race (ΔCFI = 0, ΔRMSEA = 0, ΔSRMRd = +.001, $\chi^2_{\text{difference}}$ (1) = 1.337, ns); this modified constrained model does not indicate improved fit over the fully constrained model. Therefore, in the final model (results shown in Figure 5), the path from values to attainment is allowed to vary by race, but the path from SES to attainment is constrained to be equal (CFI = .924, RMSEA = .034, SRMR = .053, χ^2 (981) = 1771.024, p < .001). Because the modified constrained model fits the data as well as the baseline model and the coefficient for the relation of expectations to attainment is

strong and significant for both groups, there is support for the hypothesis that expectations contribute to attainment for both African American and White youth.

Research Question 4. Does the model of educational attainment differ for youth from low and high SES backgrounds?

Model equivalence is tested using two different indicators of SES – parent education and family income-to-needs; separate multiple-group comparisons are presented for each indicator. For the parent education analysis, youth with parents having a high school degree or less were compared to youth with parents having at least some post-secondary education (Figure 6). Model equivalence is assessed by comparing two models: a) a model with the structural paths constrained to be equal across the two groups (constrained model); and b) a model allowing the paths to vary across the two groups (baseline model). The baseline (CFI = .922, RMSEA = .034, SRMR = .051, χ^2 (940) = 1708.611, p<.0001) and constrained (CFI = .906, RMSEA = .034, SRMR = .052, χ^2 (973) = 1744.710, p<.0001) models fit the data well, and the constrained model is not significantly worse than the baseline model ($\chi^2_{\text{difference}}$ (33) = 32.319). The analysis supports the hypothesis that the model applies equally well to youth with parents having some post-secondary education and parents who have earned a high school degree or less.

As a robustness check to ensure that there are no group differences that were missed by the omnibus test, the full model is tested separately for youth whose parents have high and low education (see Figure E2). In these models, two paths appear to be different for youth whose parents have low versus high education: a) SES to attainment, and b) educational values to attainment. The relation of SES to attainment is strong and

significant for youth whose parents have at least some postsecondary education (b= .14, p < .001) and not for youth whose parents have a high school degree or less (b = .03, ns); educational values are a strong and significant predictor of attainment for youth whose parents have some postsecondary education (b= .17, p < .001), but not for youth whose parents have a high school degree or less (b = .03, ns). To follow-up these results, the constrained model above is compared with two modified versions of the constrained model. First, the path from SES to attainment is allowed to vary across parent education level (ΔCFI = 0, ΔRMSEA = 0, ΔSRMR = 0, $\chi^2_{\text{difference}}$ (1) = 4.130, p < .05); this modified constrained model indicates improved fit over the fully constrained model. Second, the path from educational values to attainment is allowed to vary across parent education level (ΔCFI = 0, ΔRMSEA = 0, ΔSRMR = 0, $\chi^2_{\text{difference}}$ (1) = .394, ns); this modified constrained model does not indicate improved fit over the fully constrained model. Therefore, in the final model (results shown in Figure 6), the path from SES to attainment is allowed to vary by level of parent education, but the path from values to attainment is constrained to be equal (CFI = .922, RMSEA = .034, SRMR = .052, χ2 (972) = 1740.332). Because the modified constrained model fits the data as well as the baseline model and the coefficient for the relation of expectations to attainment is strong and significant for both groups, there is support for the hypothesis that expectations contribute to attainment for youth whose parents have higher and lower levels of education.

For the family income-to-needs analysis, youth whose family income-to-needs ratio are less than approximately 200% of poverty are compared to youth whose family

income-to-needs ratio was more than approximately 200% of poverty (Figure 7). Model equivalence is assessed by comparing two models: a) a model with the structural paths constrained to be equal for the two groups (constrained model); and a model allowing the paths to vary for the two groups (baseline model). The baseline (CFI = .915, RMSEA = .036, SRMR = .055, χ^2 (939) = 1751.257, p<.0001) and constrained (CFI = .914, RMSEA = .036, SRMR = .056, χ^2 (973) = 1786.620, p<.0001) models fit the data well, and the constrained model is not significantly worse than the baseline model. These results indicate that the hypothesized model of educational attainment applies to youth from low and high socioeconomic backgrounds, as defined by family income-to-needs or parents' level of education.

As a robustness check to ensure that there are no group differences that were missed by the omnibus test, the full model is tested separately for youth from families with high and low family income-to-needs rations (see Figure E3). In these models, two paths appear to be different for the two groups: a) achievement to self-concept of ability, and b) educational values to attainment. The relation of achievement to self-concept of ability is strong and significant for youth from low income-to-needs families (b= .37, p < .01) and not for youth from high income-to-needs families (b = .11, ns); educational values are a strong and significant predictor of attainment for youth from high income-to-needs families (b= .17, p < .01), but not for youth from low income-to-needs families (b = .05, ns). To follow-up these results, the constrained model above is compared with two modified versions of the constrained model. First, the path from achievement to self-concept is allowed to vary across income-to-needs levels (ΔCFI = +.001, ΔRMSEA = 0,

ΔSRMR = 0, $\chi^2_{difference}$ (1) = 3.345, p < .10); this modified constrained model indicates a modest improved fit over the fully constrained model. Second, the path from educational values to attainment is allowed to vary across income-to-needs levels (ΔCFI = 0, ΔRMSEA = 0, ΔSRMR = 0, $\chi^2_{difference}$ (1) = 1.201, ns); this modified constrained model does not indicate improved fit over the fully constrained model. Therefore, in the final model (results shown in Figure 7), the path from achievement to self-concept of ability is allowed to vary by family income-to-needs, but the path from values to attainment is constrained to be equal (CFI = .915, RMSEA = .036, SRMR = .056, χ2 (972) = 1783.148). Because the modified constrained model fits the data as well as the baseline model and the coefficient for the relation of expectations to attainment is strong and significant for both groups, there is support for the hypothesis that expectations contribute to attainment for youth whose parents have higher and lower levels of education.

Research Question 5. Does the hypothesized model of educational attainment differ by gender?

To test for process differences among males and females, model equivalence is assessed by comparing two models: a) a model with the structural paths constrained to be equal for the two groups (constrained model); and a model allowing the paths to vary across the two groups (baseline model). The baseline (CFI = .919, RMSEA = .035, SRMR = .056, χ^2 (949) = 1755.691, p<.0001) and constrained (CFI = .920, RMSEA = .034, SRMR = .053, χ^2 (983) = 1777.844, p<.0001) have an acceptable fit to the data.

The constrained model was not significantly worse than the baseline model, suggesting that the model applies equally well to males and females (Figure 8).

As a robustness check to ensure that there are no group differences that were missed by the omnibus test, the full model is tested separately for males and females (see Figure E4). In these models, two paths appear to be different for the two groups: a) achievement to self-concept of ability, and b) educational values to attainment. The relation of achievement to self-concept of ability is strong and significant for females (b= .27, $p < .05$) and not for youth from males (b = .11, ns); educational values are a strong and significant predictor of attainment for males (b= .24, $p < .01$), but not for females (b = .06, ns). To follow-up these results, the constrained model above is compared with two modified versions of the constrained model. First, the path from achievement to self-concept is allowed to vary by gender (ΔCFI = 0, ΔRMSEA = 0, ΔSRMR = -.001, $\chi^2_{difference}$ (1) = 1.551, ns); this modified constrained model does not indicate an improved fit over the fully constrained model. Second, the path from educational values to attainment is allowed to vary by gender (ΔCFI = 0, ΔRMSEA = 0, ΔSRMR = 0, $\chi^2_{difference}$ (1) = 1.266, ns); this modified constrained model does not indicate improved fit over the fully constrained model. Therefore, in the final model (results shown in Figure 7) the fully constrained model is used. The fully constrained model fits the data as well as the baseline model and the coefficient for the relation of achievement to self-concept of ability is not significantly different statistically for males and females; this finding indicates that achievement does not influence self-concept differently for males and females.

Discussion

The purpose of this study is to improve our understanding of the factors that contribute to educational attainment. Specifically, I examine a) the role of educational expectations as a contributor to educational attainment; b) the validity of a model of educational attainment that draws from both sociological and psychological theory by including SES, achievement, self-concept of ability, educational values, and educational expectations as contributors to educational attainment; and c) the extent to which the hypothesized model of educational attainment varies by race, SES, and gender. Overall, the hypotheses tested in this study are supported: educational expectations predict attainment consistently and strongly in all models tested, and expectations contribute to attainment similarly for African American and white youth, youth from low and high SES families, and males and females.

This study adds to the literature regarding the influence of expectations on attainment in important ways. First, the conceptual model tested expands upon status attainment theory to include aspects of the expectancy-value theory of achievement motivation and examines the association between expectations and attainment after accounting for SES, achievement, and aspects of motivation. Identifying and examining the key contributors to educational attainment is an important area of research across multiple disciplines in the social sciences, including sociology, educational and developmental psychology, and economics. Recognizing the importance of educational attainment as a determinant of occupational and economic success, researchers in each of

these domains seek to explain the processes by which individuals reach varying levels of educational attainment. A goal of this study is to bridge sociological and psychological disciplines by proposing and assessing a combined model of educational attainment that examines the relative contributions of SES, achievement, educational expectations, and certain aspects of motivation, including self-concept of ability and educational values.

Second, the methodological design of the study adds to the strength of the findings presented. In particular, a within-subject fixed-effects approach is used to minimize omitted variable bias, thereby addressing issues of endogeneity. The validity of the measurement model used to represent the constructs included in the hypothesized model is also tested for each of the subgroups examined. It is often assumed that educational constructs can be measured similarly for individuals from varying racial, SES, and gender groups; however, this assumption is rarely confirmed in empirical studies by comparing measurement models across subpopulations. Thus, an important contribution of the present study is the finding that the proposed indicators adequately represent their respective constructs for all of the groups.

Third, group differences in the conceptual model are examined by race and SES to separate the often confounded effects of race and SES on attainment. Compared to White youth, African American youth are disproportionately represented in low-SES groups making it difficult to disentangle differences in educational trajectories based on SES and racial/ethnic status. Examining group differences by race and two definitions of family SES – parent education and income-to-needs – helps to separate the effects of SES and race on the relations in the hypothesized model of educational attainment.

Do educational expectations contribute to attainment above and beyond SES and achievement?

In this study, youth whose educational expectations increased from 7th to 11th grade attained more education three years after high school ended than youth whose expectations remained the same or declined over that period. This finding is consistent with previous research that finds a strong and direct association between expectations for educational attainment and later attainment (Mello, 2007; Portes & Wilson, 1976; Sewell et al., 1969, 1970). Sewell and colleagues (1969, 1970) lead the use of status attainment theory to explain educational attainment, and they found consistent support for the role of expectations as a contributor to attainment. Since that time, many other researchers report that expectations are a strong predictor of attainment (Mello, 2007; Portes & Wilson, 1976). To my knowledge, only absolute levels of expectations - not residual change over time - have been examined in this body of empirical research. The methods used in this study build upon prior work to examine the influence of change in expectations on attainment, thereby reducing omitted variable bias. These findings strengthen the assertion that expectations for success are important contributors to educational attainment.

What is gained by adding self-concept of ability and educational values to status attainment theory?

A strength of this study is that the role of expectations as a predictor of attainment is assessed in two separate models – a more parsimonious model based in status attainment theory (as discussed for the previous question) and a more complex model that

includes two motivational constructs from the expectancy-value theory of achievement-motivation. This combined model bridges disciplinary lines by tapping both sociological and psychological traditions, respectively, and it provides a more comprehensive understanding of the factors that lead to educational attainment than relying on status attainment theory alone.

Although including self-concept of ability and educational values, did not improve the model's ability to explain educational attainment (i.e. amount of variance explained) above and beyond the paths posited by the status attainment model, they did highlight a potential pathway by which achievement leads to expectations. In particular, self-concept of ability and educational values partially mediate the association between achievement and expectations, and educational values are directly related to attainment. These findings are not surprising; self-concept of ability is expected to reflect actual achievement levels (i.e. high-achieving youth should have higher academic self-concepts than low-achieving youth) and contribute to educational values (i.e. youth who believe they are good at school will likely place more value on education).

The finding that self-concept of ability no longer influences expectations after accounting for values contradicts achievement-motivation theory, which posits that self-concept of ability leads directly to both expectations for success and values (Eccles et al., 1998). In this study, the direct association between self-concept of ability and expectations is fully mediated by educational values. The root of this discrepancy, in part, may relate to the outcomes under study. Here, educational expectations are assessed as expectations for the amount of post secondary education youth expect to attain (this

definition is consistent with status attainment theory); in contrast, the achievement-motivation literature emphasizes domain-specific expectancies for success (e.g. expected grade earned in math, anticipated performance on an English paper). It seems logical that self-concept of ability in specific subjects would be more closely tied to expected success in that subject area than it is to overall educational expectations for post-secondary attainment. For instance, students who have low self-concept of ability in math may still expect to attain a bachelor's degree just in an area that does not require strong math skills. A future area of investigation would be to assess the potentially different relations of youth overall self-concept of ability and more general self-esteem to educational expectations. Higher levels of self-esteem may contribute to educational expectations in that youth who are generally confident in themselves may expect to attain more post secondary education and actually attain more years of education than youth who have less confidence. This hypothesis is supported by previous research by Portes and Wilson (1976) who found that general self-esteem predicted attainment for African American males. Overall, the findings of this study support the inclusion of expectations and indicators of motivation, including self-concept of ability and educational values as predictors of educational attainment.

Does the hypothesized model of educational attainment differ for African American and White youth?

A major contribution of this study is that the association between educational expectations and later educational attainment is examined across multiple groups,

including for African American and White youth and youth from low and high SES families. According to theory and empirical research, higher educational expectations lead to greater educational attainment for all groups. However, previous research on African American youth indicate that they hold unjustifiably high educational expectations that do not match their academic performance or educational attainment, leading many to question whether this motivational characteristic is an important contributor to attainment for this subpopulation. Nevertheless, in this study, expectations predict attainment regardless of achievement and SES for African Americans. This finding is consistent with those of two other empirical studies that find support for the link between expectations and attainment for African American males, even after accounting for achievement and SES (Mello, 2007; Portes & Wilson, 1976). In particular, the strong and persistent association between expectations and attainment found in the current study reinforces a similar finding in a recent study in which educational expectations predicted post-secondary attainment for African American males after accounting for achievement and SES (Mello, 2007).

Portes & Wilson (1976) tested the validity of status attainment theory for a nationally-representative sample of African American and White males. The authors report that: a) educational expectations during senior year of high school predicted educational attainment two years after high school for both groups, and b) academic performance was a strong predictor of attainment for Whites, but higher educational expectations and confidence in one's abilities were more strongly related higher levels of attainment for African Americans.

Relating the findings of the present study to those of the study by Portes & Wilson (1976), two points of comparisons emerge. First, the results of the two studies are consistent in that expectations relate to attainment for African Americans (only males in the prior study), even if their expectations are not fully aligned with their achievement and attainment. However, self-esteem was also a strong a significant predictor of attainment for African American males in the earlier study by Portes & Wilson, which contradicts the finding of this study that self-concept of ability is not directly related to attainment after accounting for expectations and values. Although domain-specific self-concept of ability is emphasized as a predictor of educational outcomes over general self-esteem by achievement motivation theory, future research could involve a modified model of educational attainment that incorporates a more general self-esteem construct.

Although I did not expect there to be race differences for other relations in the hypothesized model, two associations are different for African American and White youth. Educational values are a strong and significant predictor of attainment for Whites and not African Americans. In contrast, there is evidence that SES is strongly linked to attainment for African Americans than for Whites (this difference emerges when groups are examined separately, but does not reach significance in the multiple-group comparison). According to these group differences, African American youth may depend more on socioeconomic resources to pursue post-secondary education than Whites. This assertion is supported by the finding that educational values were strong and significant predictors of attainment for youth from high SES families and not for youth from low SES families (as indicated in Figures E2 and E3; the difference in this relation did not

reach statistical significance in the multiple-group comparisons). These findings suggest that educational values may be more important for White youth than African American youth, but the difference may be confounded with SES. White youth, particularly those from more affluent families, may have greater access to resources that make postsecondary possible than do African American youth; these resources may include access to knowledgeable adults who can assist with the college and loan application processes. Values may be a stronger predictor of attainment for Whites than for African Americans for the sheer reason that SES is not. If White youth value education and want to pursue postsecondary education, limited resources may be less of an obstacle to obtaining that goal than for African American youth with similar values. Future research should explore the influence of SES and educational values on educational attainment for African American youth and youth from low SES families to illuminate this finding.

In interpreting the role of values as a contributor to attainment, it is important to note that educational values may not be entirely represented by the indicators used in this study. The educational values constructs in 7^{th} and 11^{th} grades are not measured as reliably as are other model constructs. In particular, the factor loadings for the indicators of educational values in 7^{th} grade were lower than those for indicators of other model constructs. Although the indicators used in 11^{th} grade were a better representation of educational values, it is possible that youth educational values are not completely represented in this study. This may be due to the broad range of indicators used to represent educational values. Eccles and colleagues (1998) identify four distinct types of values: attainment, intrinsic, utility, and cost. Utility value, or the extent to which youth

perceive education as a future benefit, is the most strongly related to achievement-related behavior in adolescents (Wigfield & Eccles, 1992). Although utility value is included in the educational values construct used in the present study, information regarding youths' perception of utility was limited; therefore, intrinsic value (youth enjoyment of school) and attainment value (the importance that youth place on doing well at school) are also included. In future research on the relation of educational values to achievement and educational attainment, more extensive data should be collected regarding adolescents' perceived utility value of education,

Does the hypothesized model of educational attainment differ for youth from high and low SES backgrounds?

A major contribution of this study is that model equivalence is tested across race and socioeconomic background. Similar to previous research on African American youth, empirical studies suggest that youth from low SES families hold unjustifiably high educational expectations that are not aligned with academic performance or educational attainment, leading many to question whether expectations lead to attainment for this subpopulation. Because African Americans are disproportionately represented in low SES groups it is important to separate group differences by race and SES. Few studies, if any, have tried to unconfound the effects of race and SES on the relations among achievement, expectations, motivation, and attainment. This study addresses an important shortcoming in the literature and finds expectations predict attainment for both African American youth and youth from low SES families.

Unexpectedly, there is a model difference in the association between achievement and self-concept of ability for students from families with low and high income-to-needs ratios. Specifically, achievement predicts self-concept of ability for youth from families who are below 200% of the poverty threshold and not for youth from families who are above 200%. This difference may be a function of how self-concept of ability is formed for youth from varying SES backgrounds. Compared to youth from disadvantaged backgrounds, youth from more affluent families may get more positive feedback from teachers and parents, which contributes to their self-concepts of ability. In this way, the limited relation of achievement to self-concept for youth from high SES families may result from additional factors that contribute to the formation of their self-concepts.

Does the hypothesized model of educational attainment differ for males and females?

Although expectations were not expected to predict attainment differently for males and females, prior research suggests that achievement informs self-concepts of ability differently for males and females. In particular, Marsh & Yeung (1998) indicate that males reported higher self-concepts of ability than females despite the finding that females had higher levels of achievement. This gender difference is apparent in the present study when models are tested separately for males and females (Figure E4); achievement predicts self-concept for females but not for males. However, the gender difference was not strong enough to produce a statistically significant difference in the multiple-group comparison. It is not surprising that the gender difference in this study is less pronounced than the gender difference found by Marsh & Yeung. In this study, the association between achievement and self-concept is net earlier reports of self-concept;

the relations of self-concept in 7th grade to achievement and self-concept in 8th grade are controlled. The achievement construct in the present study reflects school grades from 7th and 8th grade, and may not be able to adequately predict residual change in self-concept from 7th to 8th grade. The finding from the separate models by gender suggests that achievement may influence youth self-concept of ability differently for boys and girls and that gender differences should continue to be examined in studies that assess the relations among these constructs.

Role of expectations and other motivational constructs

Adolescents succeed in school and attain higher levels of education partly because of achievement and ability, but also because they expect to succeed and are highly motivated. Motivation to earn a high school degree and attain higher levels of education and believing that such success is possible promote improved educational outcomes (Eccles, 1983; Eccles, Wigfield, & Schiefele, 1998; Mello, 2007) and may contribute to course grades, passing or failing, positive responses from teachers, and overall success.

These motivational attributes may be the glue that keeps students in school. Every year in school results in improved employment and educational outcomes (Heckman et al., 2006). There are data showing that simply staying in school, even with minimal levels of accomplishment (e.g. high school degree), has positive consequences for later work (Carneiro & Heckman, 2003; Heckman & Rubinstein, 2001). One illustration of the influence of motivation on later outcomes comes from the long-term impacts of two early intervention programs, the Perry Preschool Project and the

Abecedarian Project. In these studies, children were randomly assigned to participate in early preschool education program or be a member of a control group who did not receive the program. As adults, members of the program groups in both studies continued to have more positive work and earnings outcomes than members of their respective control groups despite declines in differences on achievement test performance (Karoly, Cannon, & Kilburn, 2005). Heckman and other economists have argued that one reason for this pattern may be improvement in "noncognitive" as well as cognitive skills that contribute to success (Heckman & Rubinstein, 2001); these noncognitive skills include motivation and expectations for success. The findings of this study support these conclusions indicating that motivation and expectations are important contributors to educational attainment.

Limitations

While interpreting the findings of this study it is important to note limitations regarding the sample, measures, and method used. First, the sample used in this study was drawn from a county in Maryland. Despite the fact that the sample is not nationally-representative, it includes youth from varying SES backgrounds and several ecological settings: low income, high risk urban neighborhoods; middle class suburban neighborhoods; and rural, farm-based neighborhoods. The depth and consistent use of measures at each wave helps to compensate for its lack of representativeness and allows for assessing residual change in the constructs included in the hypothesized model.

Although this sample was appropriate for examining differences among African American and White youth, other racial-ethnic groups are not represented in this sample.

However, there is a wide socioeconomic range for both African American and White youth in the current sample, which assists the goal of separating the effects of race and SES on the hypothesized model of educational attainment.

Although SEM is often referred to as causal modeling, it is imperative that the reader understand that the processes tested here are by no means causal. Certain characteristics of this study help to address this issue. First, the use of a longitudinal, within-subjects fixed-effects design addresses problems of endogeneity. Using a within-subject fixed-effects approach reduces the likelihood that the observed associations are biased by unmeasured variables. For each of the predictor variables (achievement, self-concept of ability, educational values, and educational expectations) initial levels were taken into account by regressing each predictor on its corresponding measurement at an earlier time (7^{th} grade). This procedure corrects for within-subject autocorrelation across time thereby reducing omitted-variable bias and addressing issues of endogeneity that simple OLS regression cannot (Duncan, Magnuson, & Ludwig, 2004). Second, expectations are considered when youth are in the 11^{th} grade – a point in their educational careers when they should be relatively certain about their educational plans, allowing for more realistic expectations than in earlier grades. Finally, this model is guided by strong theoretical frameworks that have been supported in large bodies of empirical work.

An important caveat to the conclusions of this study is that the findings might have been different if educational attainment had been measured later. Because the educational attainment measure is 3 years post high school, it is not possible to say that final educational attainment was modeled in this study. Certain groups may take longer to

earn post-secondary degrees or certificates, or they may return to school at later times that are beyond the three-year mark. Consequently, future research should examine these processes in samples that extend further into adulthood.

Implications

The findings of this study have implications for educational research and practice. Educational programs and interventions are generally designed to improve the educational outcomes of youth who would otherwise perform poorly. An explicit goal of these programs is to improve academic performance and educational attainment. Experimental evaluations of these programs are often conducted to assess whether or not the program is successful at improving youth outcomes. In these studies youth are randomly assigned to either a treatment or a control group, and only those in the treatment group receive the program under study. Then, program effects are assessed by comparing outcomes for the treatment and control groups. If youth outcomes are better for the treatment than control group, then study investigators may conclude that the program was a success.

Two such programs – Upward Bound and the Quantum Opportunities Program – were evaluated using a random experiment design to determine whether the programs improved youth educational outcomes. In a study of 536 Upward Bound programs across the United States, which provided academic instruction, tutoring, counseling, mentoring, college and career planning, Myers & Schrim (1999) report that the program was successful in that adolescents who participated in the program reported higher expectations than those who did not. Another evaluation was conducted to assess the

effects of the Quantum Opportunities Program, another program that offered education-related activities (e.g. tutoring, homework assistance, college preparation services, and community service opportunities) to students in the 9th grade. Compared to the control group, program participants were less likely to drop out of high school, more likely to attend a post-secondary institution one year after completing the program, and reported higher educational expectations in the 12th grade than their control group counterparts (Hahn, 1994).

In written reports for each of these programs, educational expectations were examined as a barometer of program success. In each study, treatment group youth reported higher expectations than control group youth after participating in the program, and study investigators concluded that the programs were successful because they increased educational expectations for program participants. In this way, expectations are used as a proxy for actual attainment as data on educational attainment are often not yet available for evaluations of interventions; students with higher educational expectations are expected to attain more years of schooling than students with lower expectations. The results of this study support the belief that expectations contribute to attainment and should be assessed as an outcome in experimental studies of interventions. To further strengthen this assertion, a direction for future research is to collect data on into adulthood to determine the extent to which increased expectations as a result of program participation lead to increased educational attainment. As for applied implications, school personnel and practitioners should not discount the power of motivation to keep students in school and propel them to pursue further education beyond high school.

Improving educational expectations among students who are already doing well may promote higher educational attainment. Encouraging higher expectations among students who are doing well in school may increase the likelihood that these students apply to, enroll in, and complete college.

Conclusion

Many people who influence the educational trajectories of adolescents – researchers, policy makers, practitioners, and parents – believe that encouraging high expectations leads to higher educational attainment. A primary concern of these same individuals is increasing educational attainment among students, and in particular among low-income and minority students. African American adolescents and youth from low-SES families who have poor academic performance and attain low levels of education are at a disadvantage in both the educational system and work force. Because African Americans are more likely to live in low socioeconomic circumstances, they are especially likely to attain low levels of education and hold jobs with limited financial opportunity. For that reason, we should be especially concerned about the educational outcomes of these groups and the factors that contribute to higher achievement and attainment.

Receiving a quality education that extends beyond high school is one of the few resources available to improve the chances that these students will succeed in our society. The findings of this study suggest that expectations do contribute to educational attainment. Enhancing our understanding of these issues can facilitate the creation of supports that help African American and students from low SES families set and achieve

high academic standards. The question now becomes, what programs, practices, and other external practices, are needed to translate high expectations into educational attainment. Further research is needed to better understand how these factors contribute to educational attainment collectively.

"Shoot for the moon. Even if you miss, you'll land among the stars."

- Anonymous

Table 1. Description of Study Measures

Construct	Grade-Level	Indicator	Scale	Reporter
Socioeconomic status	7th grade	Family income	1=less than $5,000; 16=greater than $75,000	Parent
		Parent education	5=5th grade; 20 = doctorate, M.D.	
		Parent occupational status	0=low prestige; 100=high prestige	
		Marital status	0= not married; 1=married	
Achievement	7th & 8th grades	English course grade	1 = E; 5 = A	School
		Science course grade	1 = E; 5 = A	
		Math course grade	1 = E; 5 = A	
Self-concept of ability	7th & 8th grades	How good are you in math?	1= not good at all; 5= very good	Youth
		How good are you in other school subjects?	1= not good at all; 5= very good	
Educational values	7th grade	I have to do well in school if I want to be a success in life*	1=strongly agree; 5=strongly disagree	Youth
		Even if I do good in school, I still won't be able to get a good job when I grow up.		
		Schooling is not so important for kids like me.		
		I learn more useful things from friends and relatives than I learn in school.		
		Getting a good educ is best way to get ahead in life for kids in my neighborhood.*		
		The school teaches me things that my family wants me to learn.*		
		I often learn a lot from my homework.*		
	11th grade	I have to do well in school if I want to be a success in life*	1=strongly agree; 5=strongly disagree	Youth
		Schooling is not so important for kids like me.		
		Getting a good educ is best way to get ahead in life for kids in my neighborhood.*		
		School is a waste of time.		
		I don't really care about school.		
		I often learn a lot from my homework.*		
		Education really pays off in the future for people like me.*		
Educational expectations	7th grade	How far do you think you actually will go in school?	1=8th grade or less; 9=JD, PhD, MD	Youth
	11th grade	How far do you think you actually will go in school?	1=11th grade or less; 8=JD, PhD, MD	Youth
Educational attainment	3 years post HS	What is the highest grade of school you have completed?	1=less than HS; 8=4-yr college graduate	Youth

* Indicates that indicator was reverse-coded.

Table 2. Correlations among the model constructs for the full sample.

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
SES																								
1. Family income (1= < $5K; 16= > $75K)	1.00																							
2. Parent education (years of education)	0.51																							
3. Parent occupation (0=low; 100=high)	0.50	0.50																						
4. Marital status	0.54	0.30	0.28																					
Covariates																								
5. Gender (0=boy; 1=girl)	0.00	0.01	-0.01	0.05																				
6. Race (0=White; 1=African American)	-0.18	-0.17	-0.16	-0.22	-0.05																			
7. Achievement test score (5th)	0.32	0.37	0.26	0.19	0.12	-0.31																		
8. Family size	0.04	0.02	0.01	0.32	-0.02	-0.15	0.03																	
Achievement																								
9. English (7th grade)	0.27	0.31	0.20	0.21	0.29	-0.21	0.45	-0.03																
10. Math (7th grade)	0.23	0.28	0.19	0.18	0.24	-0.23	0.45	-0.01	0.65															
11. Science (7th grade)	0.25	0.30	0.19	0.21	0.27	-0.23	0.43	0.01	0.68	0.64														
12. English (8th grade)	0.25	0.29	0.19	0.15	0.31	-0.22	0.46	-0.01	0.57	0.57	0.56													
13. Math (8th grade)	0.20	0.28	0.18	0.17	0.23	-0.27	0.39	0.10	0.54	0.56	0.55	0.60												
14. Science (8th grade)	0.25	0.30	0.20	0.19	0.24	-0.29	0.48	0.01	0.57	0.59	0.61	0.64	0.61											
Self-concept of Ability																								
15. Math (8th grade)	0.03	0.07	0.00	0.04	-0.07	-0.03	0.20	0.07	0.10	0.23	0.17	0.20	0.39	0.18										
16. Other (8th grade)	0.07	0.09	-0.01	0.09	0.08	0.01	0.22	-0.01	0.21	0.19	0.27	0.34	0.25	0.28	0.47									
Educational values (11th grade)																								
17. Well in school to be success	0.05	0.04	-0.03	0.05	0.23	0.06	0.07	0.00	0.22	0.21	0.22	0.23	0.19	0.15	0.09	0.20								
18. Schooling not important*	0.13	0.12	0.04	0.06	0.14	-0.01	0.13	-0.06	0.24	0.25	0.23	0.28	0.23	0.20	0.14	0.21	0.44							
19. Educ get ahead kids in my neighbd	0.05	0.05	-0.01	0.05	0.08	0.04	0.06	0.04	0.13	0.13	0.13	0.09	0.13	0.05	0.13	0.10	0.48	0.30						
20. School is a waste of time*	0.06	0.10	0.00	0.05	0.23	0.09	0.11	-0.04	0.24	0.20	0.23	0.21	0.19	0.16	0.07	0.17	0.54	0.51	0.40					
21. Don't care about school*	0.05	0.04	0.00	0.04	0.16	0.07	0.05	-0.05	0.16	0.13	0.16	0.15	0.12	0.12	0.05	0.16	0.40	0.44	0.28	0.68				
22. Often learn a lot from my homework	-0.04	0.00	-0.07	0.00	0.16	0.10	0.02	0.01	0.12	0.07	0.04	0.12	0.12	0.05	0.09	0.13	0.34	0.22	0.28	0.38	0.37			
23. Education pays off for people like me	-0.02	0.06	0.00	0.03	0.15	0.01	0.08	0.02	0.15	0.10	0.13	0.12	0.15	0.12	0.08	0.17	0.51	0.31	0.48	0.42	0.37	0.27		
24. Educational expectations (11th)	0.25	0.33	0.19	0.15	0.22	0.00	0.38	-0.10	0.39	0.33	0.36	0.35	0.25	0.32	0.12	0.27	0.29	0.31	0.22	0.37	0.30	0.18	0.26	
25. Educational attainment	0.31	0.38	0.22	0.22	0.14	-0.05	0.38	-0.03	0.42	0.42	0.46	0.48	0.39	0.47	0.14	0.25	0.25	0.28	0.19	0.28	0.28	0.19	0.20	0.50

* Indicates item was reverse coded

Table 3. Means, standard deviations, and sample sizes by measure for the full sample.

Characteristic	N	Mean	Std Dev
		Full Sample	
Family income (1= < $5,000; 16= > $75,000)	1319	10.03	4.22
Parent education (years of education)	1404	14.48	2.64
Parent occupational status (0=low; 100=high)	1340	72.60	19.69
Marital Status (0=no; 1=yes)	1405	0.65	0.48
African American (0=White; 1=African American)	1407	0.67	0.47
Achievement (1= low achievement; 5 = high achievement)			
English (7th grade)	1327	3.61	1.00
Math (7th grade)	1328	3.51	1.06
Science (7th grade)	1328	3.64	1.06
English (8th grade)	1123	3.71	1.04
Math (8th grade)	1123	3.43	1.01
Science (8th grade)	1124	3.68	1.02
Self-concept of ability (not good at all=1; very good=7)			
Math (7th grade)	1387	5.34	1.60
Other subjects (7th grade)	1383	5.49	1.22
Math (8th grade)	995	5.14	1.60
Other subjects (8th grade)	996	5.42	1.23
Educational expectations (1=11th or less; 8=JD/PhD/MD)			
Expectations (7th grade)	1395	6.82	1.70
Expectations (11th grade)	903	5.89	1.62
Educational values (1=strongly disagree;5=strongly agree)			
7th Grade:			
I have to do well in school if I want to be a success in life.	1394	4.46	0.80
Even if do well in school, can't get good job when older.*	1394	4.07	1.04
Schooling is not so important for kids like me.*	1393	4.26	0.92
Learn more from friends and relatives than school.*	1391	3.57	1.05
Educ best way to get ahead for kids in my neighbd.	1384	4.04	0.95
School teaches me things family wants me to learn	1390	3.95	0.86
I often learn a lot from my homework.	1382	3.59	0.97
11th Grade:			
I have to do well in school if I want to be a success in life.	872	4.30	0.93
Schooling is not so important for kids like me.*	871	4.05	0.99
Educ best way to get ahead for kids in my neighbd.	870	4.02	0.96
School is a waste of time.	869	4.19	0.96
I don't really care about school.*	872	3.96	1.08
I often learn a lot from my homework.	871	3.37	1.00
Education pays off in future for people like me.	874	4.07	0.89
Educational attainment (3 yrs post HS)	846	4.56	2.13

* Indicates that item is coded such that 5=positive educational values.

Table 4. Unstandardized coefficients for the hypothesized model of educational attainment for the full sample and for the constrained models for each multiple-group comparison.

	Full Sample		African American		White		High Parent Education		Low Parent Education		> 200% Poverty		< 200% Poverty		Females		Males	
	B	Std. Error	B	Std. Error	B	Std. Error	B	Std. Error	B	Std. Error	B	Std. Error	B	Std. Error	B	Std. Error	B	Std. Error
SES ? Achievement	0.029	0.004 ***	0.031	0.004 ***	0.031	0.004 ***	0.087	0.016 ***	0.087	0.016 ***	0.033	0.013 *	0.033	0.013 *	0.028	0.024 ***	0.028	0.024 ***
SES ? Expectations	0.035	0.009 ***	0.037	0.010 ***	0.037	0.010 ***	0.058	0.050	0.058	0.050	0.036	0.022	0.036	0.022	0.035	0.010 ***	0.035	0.010 ***
SES ? Attainment	0.054	0.014 ***	0.056	0.015 ***	0.056	0.015 ***	0.237	0.062 ***	0.022	0.077	0.053	0.022 *	0.053	0.022 *	0.053	0.014 ***	0.053	0.014 ***
Achievement ? Self-concept	0.217	0.076 **	0.220	0.078 **	0.220	0.078 **	0.238	0.079 **	0.238	0.079 **	0.128	0.097	0.399	0.116 **	0.230	0.075 **	0.230	0.075 **
Achievement ? Expectations	0.316	0.076 ***	0.320	0.076 ***	0.320	0.076 ***	0.348	0.082 ***	0.348	0.082 ***	0.314	0.082 ***	0.314	0.082 ***	0.317	0.080 ***	0.317	0.080 ***
Achievement ? Attainment	0.990	0.117 ***	0.981	0.106 ***	0.981	0.106 ***	0.999	0.122 ***	0.999	0.122 ***	1.062	0.125 ***	1.062	0.125 ***	1.002	0.119	1.002	0.119
Self-concept ? Expectations	0.061	0.083	0.069	0.088	0.069	0.088	0.042	0.067	0.042	0.067	0.099	0.075	0.099	0.075	0.049	0.077	0.049	0.077
Self-concept ? Values	0.145	0.052 **	0.141	0.055 *	0.141	0.055 *	0.142	0.053 **	0.142	0.053 **	0.161	0.059 *	0.161	0.059 *	0.146	0.052 **	0.146	0.052 **
Values ? Expectations	0.634	0.079 ***	0.647	0.072 ***	0.647	0.072 ***	0.580	0.071 ***	0.580	0.071 ***	0.618	0.077 ***	0.618	0.077 ***	0.646	0.083 ***	0.646	0.083 ***
Values ? Attainment	0.425	0.139 ***	0.131	0.169	0.733	0.174 ***	0.433	0.137 ***	0.433	0.137 ***	0.416	0.148 **	0.416	0.148 **	0.436	0.137 **	0.436	0.137 **
Expectations ? Attainment	0.289	0.045 ***	0.296	0.044 ***	0.296	0.044 ***	0.303	0.044 ***	0.303	0.044 ***	0.291	0.042 ***	0.291	0.042 ***	0.293	0.043 ***	0.293	0.043 ***

Note. The unstandardized coefficients and standard errors are the same for the two groups when paths are constrained. Coefficients and standard errors that differ by group for unconstrained paths are provided.

Figure 1. Conceptual Model of Educational Attainment

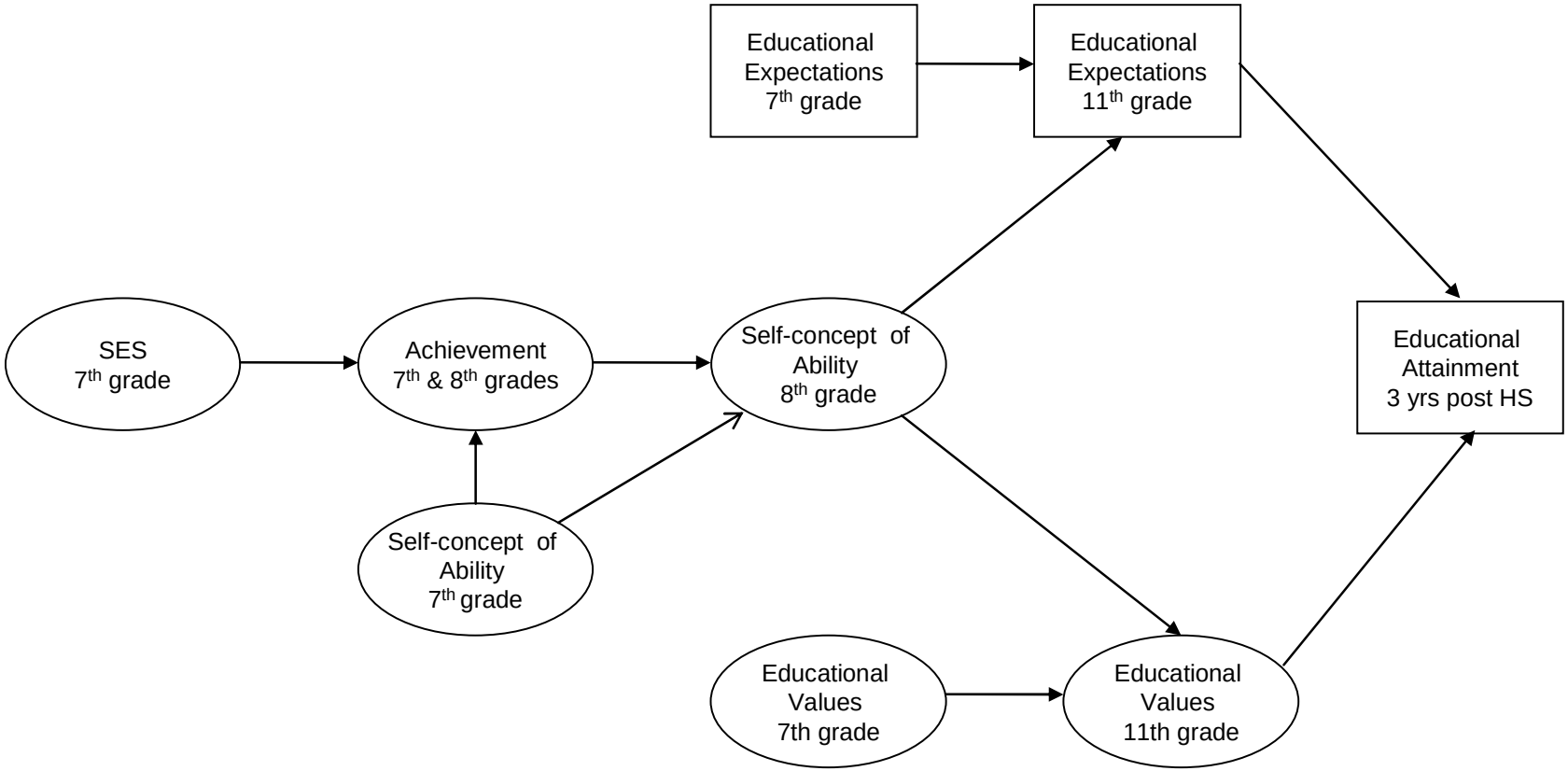
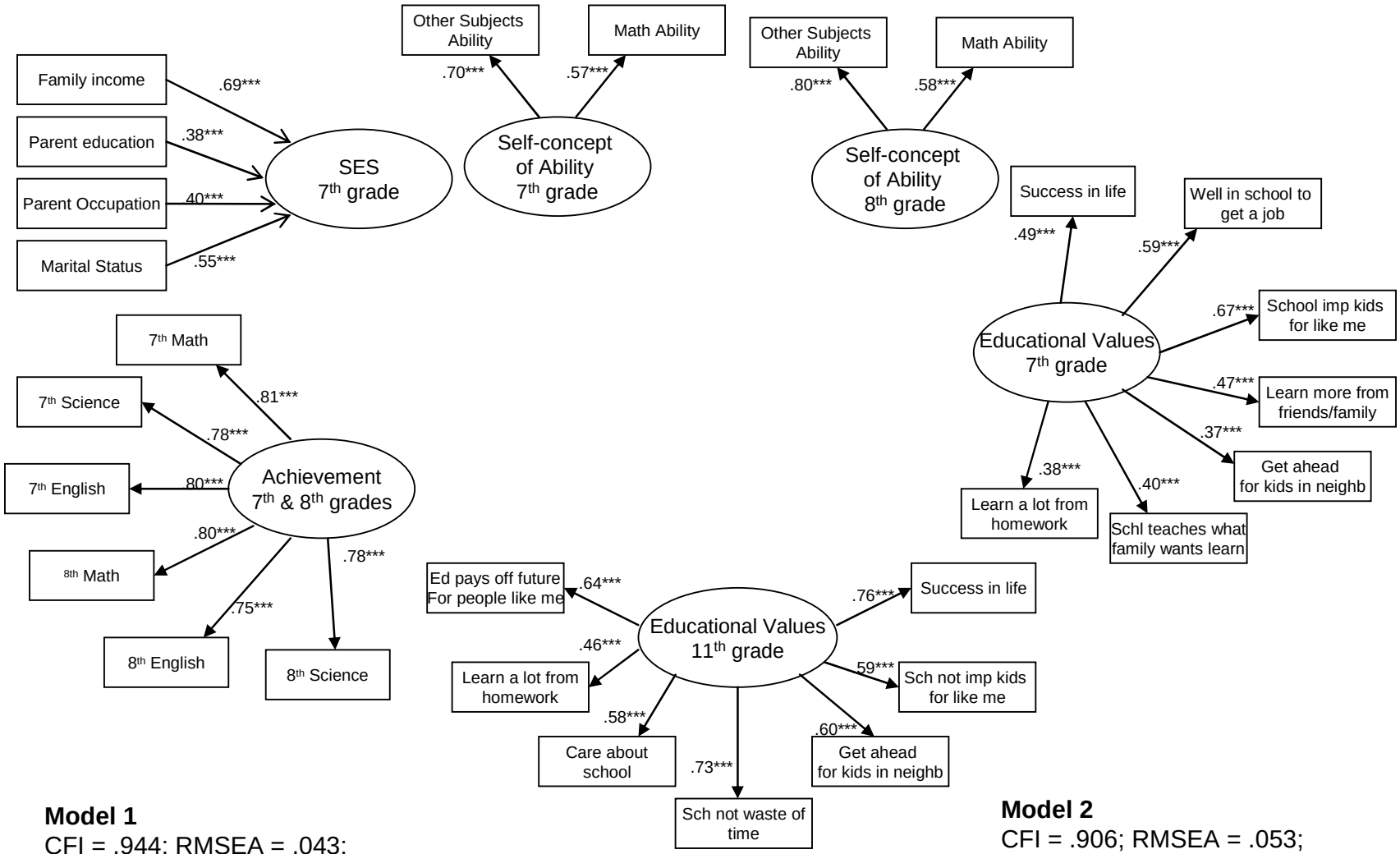


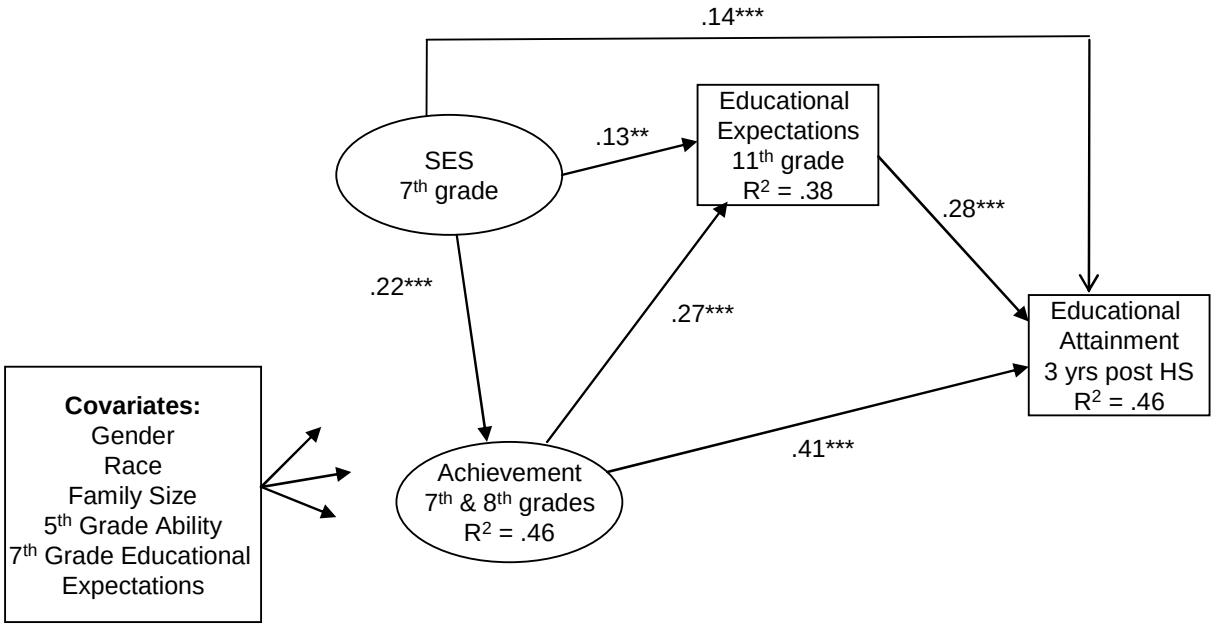
Figure 2. Measurement Model Results for the Full Sample



Model 1
CFI = .944; RMSEA = .043;
SRMR = .039; χ^2 (137) = 498.782

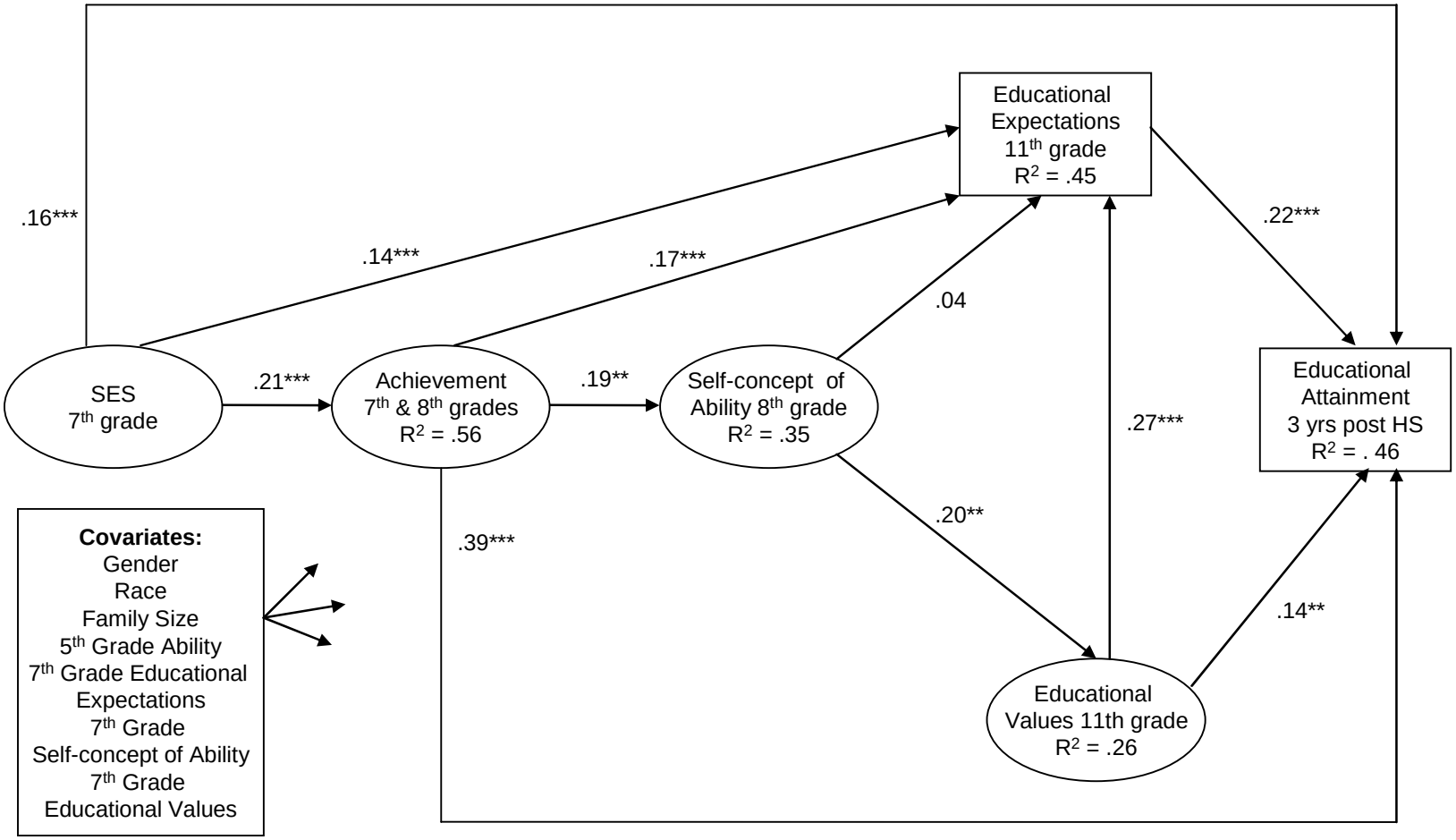
Model 2
CFI = .906; RMSEA = .053;
SRMR = .039; χ^2 (26) = 129.852

Figure 3. The Relations among SES, Achievement, Expectations, and Attainment.



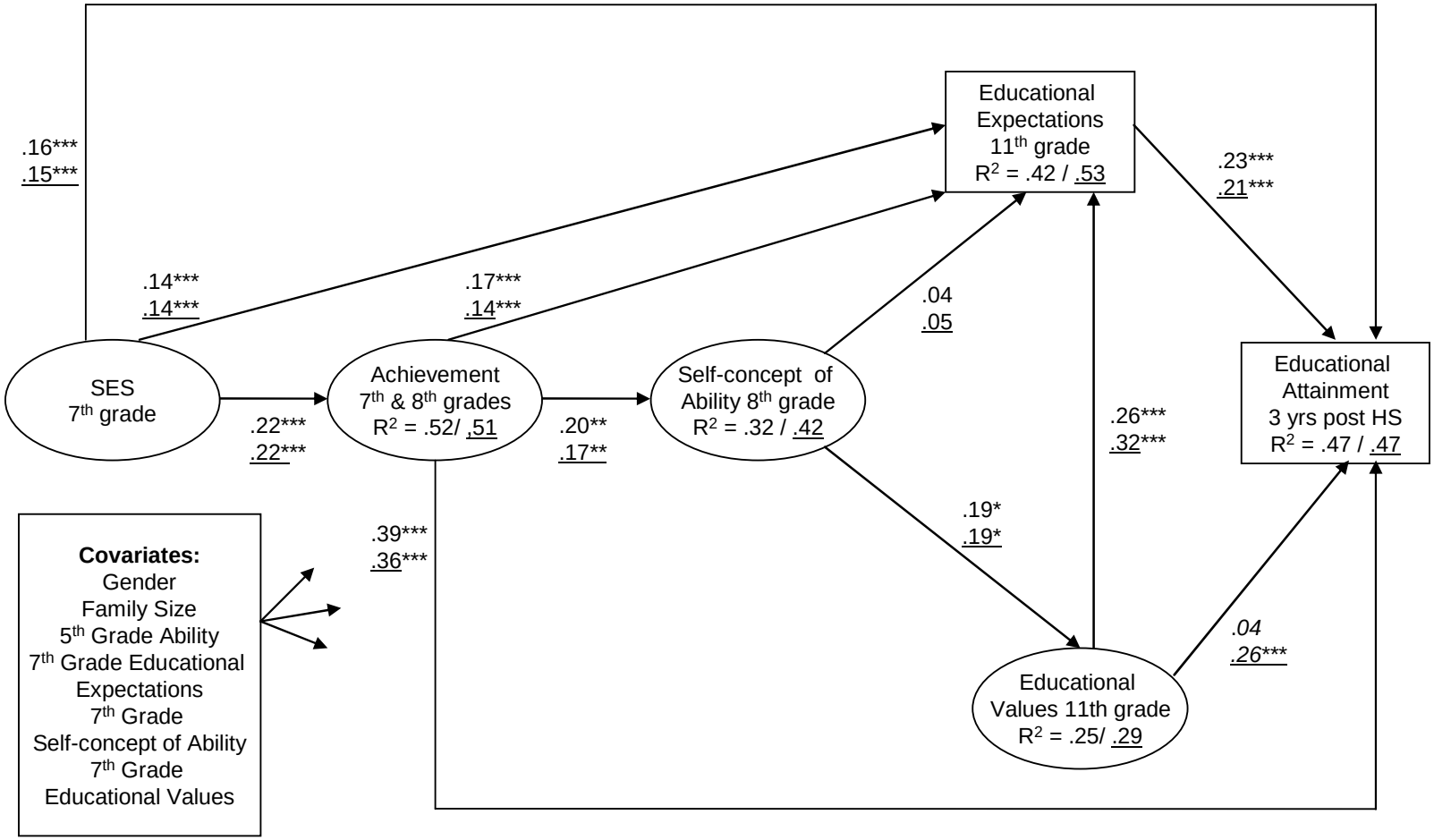
CFI = .970; RMSEA = .036; SRMR = .028; χ^2 (80) = 229.411
Note. Standardized estimates are presented above. *** p < .001, ** p < .01, * p< .05, † p < .10

Figure 4. Model of Educational Attainment Tested for the Full Sample.



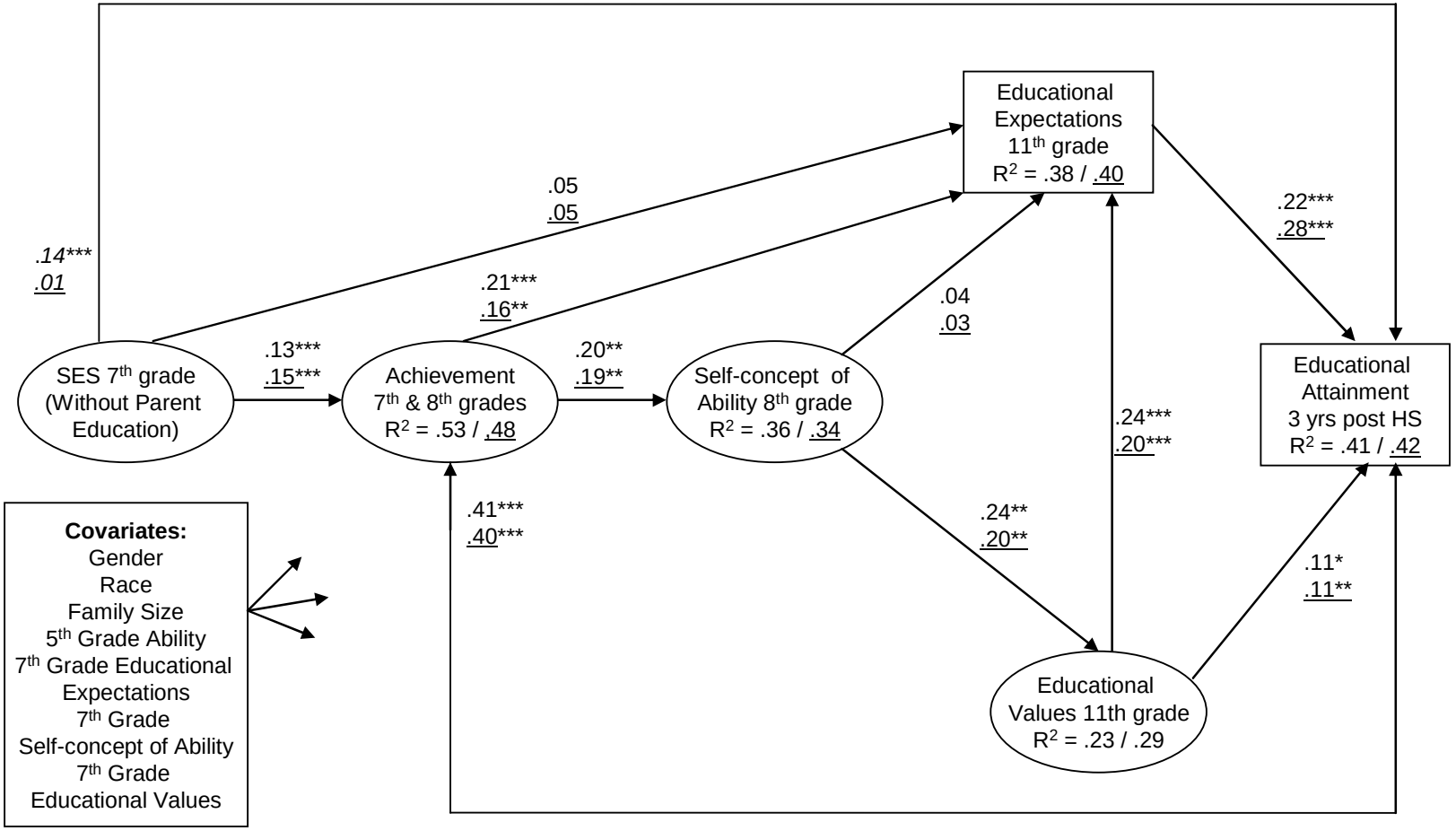
CFI = .935; RMSEA = .031; SRMR = .042; χ^2 (485) = 1161.548
Note. Standardized estimates are presented above. *** p < .001, ** p < .01, * p< .05, † p < .10

Figure 5. Model of Educational Attainment for African American and White Youth.



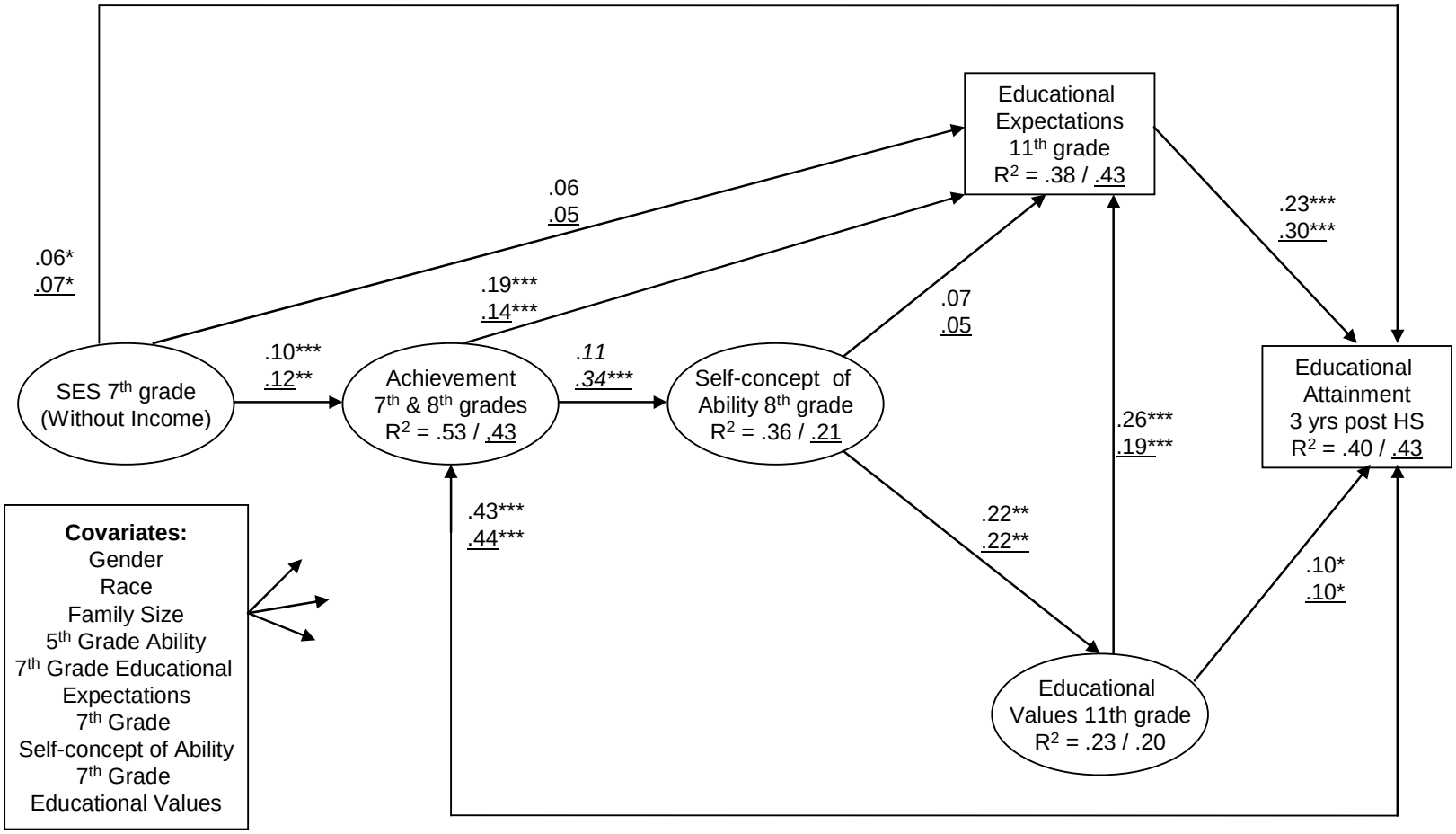
CFI = .924; RMSEA = .034; SRMR = .053; χ^2 (981) = 1771.024; *** p < .001, ** p < .01, * p< .05, † p < .10
Note. Standardized estimates are presented above and estimates for whites are underlined.

Figure 6. Model of Educational Attainment for Youth with Parents Having Low and High Levels of Education.



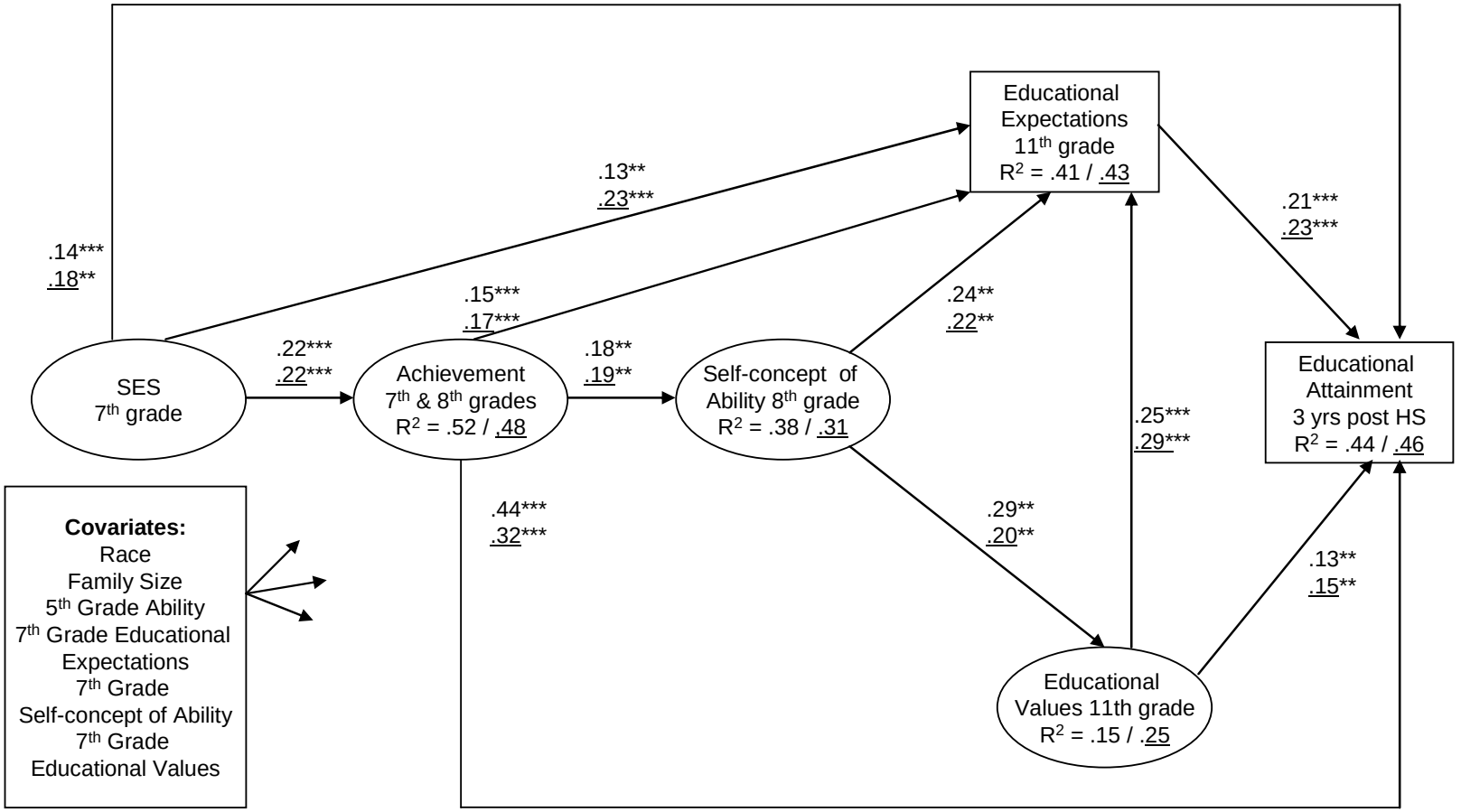
CFI = .922; RMSEA = .034; SRMR = .052; χ2 (972) = 1740.332; *** p < .001, ** p < .01, * p< .05, † p < .10
Note. Standardized estimates are presented above and estimates for the low parent education group are underlined.

Figure 7. Model of Educational Attainment for Youth with High and Low Family Income.



CFI = .915; RMSEA = .036; SRMR = .056; χ2 (972) = 1783.148; *** p < .001, ** p < .01, * p< .05, † p < .10
Note. Standardized estimates are presented above and estimates for the low family income-to-needs group are underlined.

Figure 8. Model of Educational Attainment for Males and Females.



CFI = .920; RMSEA = .034; SRMR = .053; χ2 (983) = 1777.844
Note. Standardized estimates are presented above and estimates for males are underlined.
*** p < .001, ** p < .01, * p< .05, † p < .10

Appendix A

Descriptive information by
race, parent education, family income-to-needs, and gender

Table A1. Correlations among the model constructs for African American and White youth.

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
SES																								
1. Family income (1= < $5K; 16= > $75K)		0.44	0.45	0.40	-0.05	0.28	0.04	0.19	0.17	0.20	0.23	0.22	0.23	0.06	0.16	0.02	0.14	0.05	0.09	0.11	0.00	-0.02	0.33	0.25
2. Parent education (years of education)	0.54		0.53	0.25	-0.04	0.36	0.02	0.29	0.30	0.28	0.32	0.29	0.30	0.12	0.18	0.01	0.14	0.10	0.11	0.08	0.03	0.09	0.36	0.35
3. Parent occupation (0=low; 100=high)	0.51	0.47		0.23	-0.04	0.24	0.06	0.17	0.16	0.12	0.16	0.19	0.25	0.03	0.08	-0.06	0.02	0.00	-0.05	0.02	-0.08	0.00	0.21	0.14
4. Marital status	0.57	0.29	0.26		0.01	0.08	0.34	0.14	0.09	0.15	0.07	0.07	0.12	-0.02	0.11	0.04	0.06	0.12	0.11	0.05	0.02	0.06	0.20	0.21
Covariates						0.06	-0.11	0.23	0.22	0.21	0.26	0.13	0.11	-0.09	0.06	0.30	0.25	0.15	0.27	0.18	0.24	0.22	0.19	0.12
5. Gender (0=boy; 1=girl)	0.02	0.02	-0.01	0.06			-0.11	0.45	0.44	0.38	0.50	0.27	0.41	0.15	0.35	0.04	0.16	0.10	0.19	0.11	0.10	0.07	0.44	0.36
6. Achievement test score (5th)	0.30	0.33	0.21	0.17	0.14																			
7. Family size	0.00	-0.02	-0.05	0.28	0.00	0.02		-0.09	-0.15	-0.12	-0.18	-0.02	-0.10	-0.04	-0.15	-0.04	-0.07	0.03	-0.08	-0.10	-0.05	0.04	-0.07	-0.06
Achievement																								
8. English (7th grade)	0.27	0.27	0.18	0.20	0.31	0.40	-0.06		0.66	0.65	0.56	0.45	0.52	0.04	0.21	0.22	0.24	0.20	0.28	0.19	0.22	0.22	0.41	0.42
9. Math (7th grade)	0.21	0.22	0.16	0.16	0.25	0.40	0.00	0.62		0.64	0.58	0.49	0.57	0.24	0.27	0.20	0.27	0.22	0.26	0.17	0.19	0.19	0.39	0.43
10. Science (7th grade)	0.23	0.28	0.18	0.18	0.30	0.40	0.02	0.67	0.61		0.52	0.47	0.59	0.19	0.35	0.28	0.29	0.22	0.31	0.23	0.14	0.25	0.45	0.49
11. English (8th grade)	0.23	0.24	0.17	0.12	0.33	0.40	0.00	0.55	0.53	0.54		0.52	0.59	0.19	0.40	0.25	0.36	0.17	0.29	0.20	0.27	0.23	0.39	0.56
12. Math (8th grade)	0.15	0.23	0.13	0.14	0.27	0.36	0.09	0.54	0.54	0.54	0.60		0.57	0.40	0.26	0.21	0.32	0.23	0.28	0.23	0.21	0.26	0.29	0.41
13. Science (8th grade)	0.21	0.25	0.14	0.14	0.29	0.44	-0.02	0.56	0.55	0.58	0.63	0.58		0.18	0.36	0.15	0.20	0.17	0.21	0.12	0.14	0.18	0.35	0.43
Self-concept of Ability																								
14. Math (8th grade)	0.01	0.04	-0.02	0.05	-0.07	0.22	0.12	0.13	0.24	0.16	0.20	0.39	0.18		0.49	0.13	0.19	0.17	0.12	0.12	0.05	0.15	0.20	0.17
15. Other (8th grade)	0.03	0.04	-0.06	0.09	0.10	0.18	0.06	0.22	0.16	0.25	0.33	0.26	0.28	0.45		0.25	0.30	0.19	0.23	0.22	0.14	0.28	0.33	0.31
Educational values (11th grade)																								
16. Well in school to be success	0.08	0.09	0.01	0.08	0.20	0.15	0.03	0.26	0.26	0.24	0.25	0.22	0.18	0.07	0.16		0.44	0.52	0.53	0.41	0.40	0.58	0.34	0.32
17. Schooling not important (R)	0.12	0.11	0.05	0.05	0.09	0.14	-0.06	0.25	0.25	0.21	0.25	0.20	0.20	0.11	0.15	0.44		0.49	0.60	0.48	0.25	0.45	0.40	0.34
18. Educ get ahead kids in my neighbd	0.06	0.04	0.00	0.03	0.04	0.07	0.06	0.12	0.12	0.12	0.07	0.11	0.02	0.11	0.04	0.45	0.20		0.51	0.36	0.27	0.57	0.35	0.32
19. School is a waste of time (R)	0.07	0.14	0.05	0.06	0.21	0.14	0.00	0.28	0.21	0.24	0.22	0.20	0.21	0.05	0.14	0.54	0.47	0.34		0.73	0.46	0.53	0.47	0.42
20. Don't care about school (R)	0.05	0.05	0.01	0.06	0.15	0.08	-0.02	0.18	0.14	0.17	0.16	0.10	0.15	0.01	0.12	0.38	0.43	0.23	0.65		0.41	0.49	0.41	0.38
21. Often learn a lot from my homework	-0.03	0.02	-0.03	0.02	0.13	0.03	0.06	0.11	0.06	0.04	0.09	0.14	0.06	0.12	0.12	0.30	0.20	0.28	0.32	0.34		0.36	0.22	0.31
22. Education pays off for people like me	-0.01	0.05	0.00	0.02	0.11	0.11	0.02	0.13	0.07	0.10	0.07	0.11	0.10	0.04	0.12	0.48	0.25	0.43	0.37	0.31	0.23		0.39	0.40
23. Educational expectations (11th)	0.23	0.32	0.19	0.14	0.23	0.39	-0.11	0.41	0.32	0.34	0.35	0.24	0.34	0.08	0.23	0.27	0.27	0.15	0.31	0.25	0.16	0.19		0.52
24. Educational attainment	0.34	0.41	0.26	0.22	0.15	0.41	-0.03	0.43	0.42	0.45	0.44	0.38	0.49	0.11	0.21	0.20	0.24	0.11	0.20	0.22	0.11	0.09	0.49	

Note. Correlations for African American youth are presented at the left of the diagonal and those for White youth are presented at the right of the diagonal.

Table A5. Means, standard deviations, and sample sizes by measure for African American and White youth.

Characteristic	N	Mean	Std Dev	N	Mean	Std Dev	Race Differences	
	African Americans			White			t stat	p value
Family income (1= < $5,000; 16= > $75,000)	869	9.48	4.31	450	11.08	3.83	6.65	0.000 ***
Parent education (years of education)	935	14.17	2.44	469	15.11	2.89	6.40	0.000 ***
Parent occupational status (0=low; 100=high)	879	70.27	20.26	461	77.06	17.74	6.08	0.000 ***
Marital Status	936	0.58	0.49	469	0.80	0.40	8.55	0.000 ***
Gender (0=boy; 1=girl)	938	0.47	0.50	469	0.52	0.50	1.70	0.090
Achievement (1= low achievement; 5 = high achievement)								
English (7th grade)	881	3.45	0.96	446	3.91	1.00	7.99	0.000 ***
Math (7th grade)	881	3.34	1.05	447	3.85	1.00	8.64	0.000 ***
Science (7th grade)	881	3.46	1.07	447	3.98	0.97	8.64	0.000 ***
English (8th grade)	765	3.55	1.04	358	4.04	0.94	7.49	0.000 ***
Math (8th grade)	766	3.25	0.99	357	3.83	0.92	9.41	0.000 ***
Science (8th grade)	766	3.47	1.04	358	4.11	0.84	10.23	0.000 ***
Self-concept of ability (not good at all=1; very good=7)								
Math (7th grade)	922	5.31	1.65	465	5.39	1.49	0.89	0.371
Other subjects (7th grade)	919	5.51	1.24	464	5.44	1.16	-1.05	0.293
Math (8th grade)	655	5.11	1.60	340	5.21	1.61	0.92	0.356
Other subjects (8th grade)	656	5.43	1.22	340	5.40	1.25	0.92	0.356
Educational expectations (1=11th or less; 8=JD/PhD/MD)								
Expectations (7th grade)	929	6.78	1.77	466	6.89	1.52	1.10	0.272
Expectations (11th grade)	582	5.89	1.65	321	5.88	1.57	-0.10	0.916
Educational values (1=strongly disagree;5=strongly agree)								
7th Grade:								
I have to do well in school if I want to be a success in life.	927	4.51	0.80	467	4.37	0.81	-2.98	0.003 **
Even if do well in school, can't get good job when older.*	928	4.08	1.07	466	4.04	0.99	-0.64	0.522
Schooling is not so important for kids like me.*	927	4.30	0.93	466	4.19	0.91	-2.08	0.037 *
Learn more from friends and relatives than school.*	925	3.58	1.08	466	3.57	0.99	-0.18	0.857
Educ best way to get ahead for kids in my neighbd.	922	4.06	0.98	462	3.98	0.89	-1.49	0.135
School teaches me things family wants me to learn	923	4.01	0.87	467	3.84	0.82	-3.47	0.001 ***
I often learn a lot from my homework.	917	3.69	0.96	465	3.40	0.97	-5.28	0.000 ***
11th Grade:								
I have to do well in school if I want to be a success in life.	565	4.34	0.91	307	4.21	0.96	-1.89	0.059
Schooling is not so important for kids like me.*	564	4.05	1.01	307	4.07	0.94	0.25	0.805
Educ best way to get ahead for kids in my neighbd.	563	4.05	0.98	307	3.97	0.94	-1.14	0.257
School is a waste of time.	562	4.26	0.93	307	4.07	1.01	-2.80	0.005 **
I don't really care about school.*	564	4.01	1.08	308	3.86	1.07	-2.04	0.042 *
I often learn a lot from my homework.	564	3.45	0.97	307	3.24	1.05	-2.98	0.003 **
Education pays off in future for people like me.	563	4.08	0.92	311	4.05	0.85	-0.43	0.668
Educational attainment (3 yrs post HS)	527	4.47	2.13	319	4.70	2.13	1.52	0.130

* Indicates that item is coded such that 5=positive educational values.

Table A6. Means, standard deviations, and sample sizes by measure for youth whose parents have high and low education.

Characteristic	N (High Parent Educ)	Mean (High Parent Educ)	Std Dev (High Parent Educ)	N (Low Parent Educ)	Mean (Low Parent Educ)	Std Dev (Low Parent Educ)	Parent Education Diff t stat	Parent Education Diff p value
Family income (1= < $5,000; 16= > $75,000)	883	11.29	3.82	435	7.49	3.84	-16.97	0.000 ***
Parent education (years of education)	935	15.85	2.12	469	11.75	0.80	-40.45	0.000 ***
Parent occupational status (0=low; 100=high)	913	78.13	16.33	426	60.74	21.03	-16.50	0.000 ***
Marital status	934	0.74	0.44	469	0.48	0.50	-9.72	0.000 ***
African American (0=White; 1=African American)	935	0.64	0.48	469	0.71	0.45	2.60	0.009 **
Achievement (1= low achievement; 5 = high achievement)								
English (7th grade)	889	3.77	0.95	435	3.26	1.01	-8.95	0.000 ***
Math (7th grade)	889	3.65	1.03	436	3.22	1.07	-7.04	0.000 ***
Science (7th grade)	889	3.81	1.01	436	3.29	1.09	-8.56	0.000 ***
English (8th grade)	761	3.87	0.99	359	3.36	1.04	-7.97	0.000 ***
Math (8th grade)	762	3.57	1.00	358	3.15	0.96	-6.57	0.000 ***
Science (8th grade)	762	3.84	0.99	359	3.34	1.00	-7.78	0.000 ***
Self-concept of ability (not good at all=1; very good=7)								
Math (7th grade)	926	5.42	1.55	458	5.19	1.67	-2.43	0.015 *
Other subjects (7th grade)	922	5.57	1.15	458	5.34	1.32	-3.27	0.001 **
Math (8th grade)	682	5.18	1.57	313	5.06	1.68	-1.11	0.268
Other subjects (8th grade)	682	5.18	1.57	313	5.06	1.68	-1.11	0.268
Educational expectations (1=11th or less; 8=JD/PhD/MD)								
Expectations (7th grade)	928	7.07	1.51	464	6.31	1.91	-8.11	0.000 ***
Expectations (11th grade)	632	6.23	1.39	269	5.10	1.85	-10.06	0.000 ***
Educational values (1=strongly disagree;5=strongly agree)								
7th Grade:								
I have to do well in school if I want to be a success in life.	930	4.46	0.80	461	4.45	0.81	-0.20	0.844
Even if do well in school, can't get good job when older.*	929	4.13	0.98	462	3.94	1.15	-3.28	0.001 **
Schooling is not so important for kids like me.*	928	4.27	0.90	462	4.25	0.96	-0.39	0.697
Learn more from friends and relatives than school.*	928	3.57	1.03	460	3.57	1.10	-0.06	0.951
Educ best way to get ahead for kids in my neighbd.	922	4.03	0.94	459	4.05	0.98	0.50	0.616
School teaches me things family wants me to learn	926	3.92	0.85	461	4.00	0.86	1.59	0.112
I often learn a lot from my homework.	920	3.52	0.97	459	3.74	0.97	3.96	0.000 ***
11th Grade:								
I have to do well in school if I want to be a success in life.	608	4.33	0.92	263	4.22	0.96	-1.63	0.103
Schooling is not so important for kids like me.*	608	4.13	0.95	262	3.87	1.06	-3.53	0.000 ***
Educ best way to get ahead for kids in my neighbd.	608	4.05	0.96	261	3.96	0.97	-1.31	0.192
School is a waste of time.	608	4.27	0.88	260	4.01	1.10	-3.69	0.000 ***
I don't really care about school.*	608	4.01	1.05	263	3.83	1.13	-2.30	0.022 *
I often learn a lot from my homework.	607	3.38	1.01	263	3.35	0.98	-0.51	0.609
Education pays off in future for people like me.	611	4.09	0.89	262	4.03	0.90	-0.90	0.367
Educational attainment (3 yrs post HS)	604	4.92	2.03	240	3.63	2.09	-8.27	0.000 ***

* Indicates that item is coded such that 5=positive educational values.

Table A7. Means, standard deviations, and sample sizes by measure for youth from families with high and low income-to-needs ratios.

Characteristic	N	Mean	Std Dev	N	Mean	Std Dev	Income-to-Needs Differences t stat	p value
	> 200% Poverty			< 200% Poverty				
Family income (1= < $5,000; 16= > $75,000)	922	12.14	3.00	396	5.11	1.98	-42.79	0.000 ***
Parent education (years of education)	922	15.17	2.60	395	13.00	2.07	-14.72	0.000 ***
Parent occupational status (0=low; 100=high)	913	77.70	17.06	345	59.65	20.55	-15.79	0.000 ***
Marital status	922	0.76	0.43	395	0.40	0.49	-13.23	0.000 ***
African American (0=White; 1=African American)	922	0.62	0.49	396	0.76	0.43	4.88	0.000 ***
Achievement (1= low achievement; 5 = high achievement)								
English (7th grade)	877	3.76	0.98	364	3.24	1.00	-8.55	0.000 ***
Math (7th grade)	877	3.65	1.05	365	3.19	1.05	-6.96	0.000 ***
Science (7th grade)	877	3.77	1.03	365	3.34	1.08	-6.59	0.000 ***
English (8th grade)	767	3.85	0.99	288	3.38	1.05	-6.85	0.000 ***
Math (8th grade)	766	3.53	1.01	289	3.23	0.97	-4.38	0.000 ***
Science (8th grade)	767	3.81	1.00	289	3.35	0.99	-6.73	0.000 ***
Self-concept of ability (not good at all=1; very good=7)								
Math (7th grade)	912	5.39	1.59	389	5.21	1.61	-1.90	0.058
Other subjects (7th grade)	908	5.54	1.18	389	5.40	1.27	-1.90	0.058
Math (8th grade)	678	5.15	1.56	274	5.11	1.67	-0.33	0.739
Other subjects (8th grade)	678	5.15	1.56	274	5.11	1.67	-0.33	0.739
Educational expectations (1=11th or less; 8=JD/PhD/MD)								
Expectations (7th grade)	914	7.02	1.53	392	6.33	1.92	-6.89	0.000 ***
Expectations (11th grade)	623	6.14	1.42	239	5.26	1.94	-7.31	0.000 ***
Educational values (1=strongly disagree;5=strongly agree)								
7th Grade:								
I have to do well in school if I want to be a success in life.	917	4.46	0.80	389	4.47	0.80	0.22	0.825
Even if do well in school, can't get good job when older.*	916	4.11	0.99	390	4.01	1.12	-1.57	0.116
Schooling is not so important for kids like me.*	915	4.26	0.92	390	4.25	0.94	-0.18	0.860
Learn more from friends and relatives than school.*	914	3.58	1.03	389	3.56	1.11	-0.34	0.735
Educ best way to get ahead for kids in my neighbd.	911	4.01	0.96	388	4.09	0.94	1.22	0.221
School teaches me things family wants me to learn	916	3.94	0.86	387	3.96	0.86	0.27	0.790
I often learn a lot from my homework.	908	3.58	0.97	386	3.63	0.97	0.88	0.380
11th Grade:								
I have to do well in school if I want to be a success in life.	610	4.31	0.93	226	4.23	0.93	-1.10	0.270
Schooling is not so important for kids like me.*	609	4.13	0.93	226	3.84	1.10	-3.82	0.000 ***
Educ best way to get ahead for kids in my neighbd.	609	4.03	0.98	226	4.00	0.93	-0.45	0.652
School is a waste of time.	609	4.22	0.94	224	4.10	0.99	-1.67	0.095
I don’t really care about school.*	609	4.01	1.05	227	3.83	1.13	-2.08	0.038 *
I often learn a lot from my homework.	609	3.35	0.99	226	3.41	1.00	0.70	0.486
Education pays off in future for people like me.	609	4.04	0.92	229	4.13	0.82	1.25	0.212
Educational attainment (3 yrs post HS)	584	4.94	2.05	227	3.68	2.06	-7.81	0.000 ***

* Indicates that item is coded such that 5=positive educational values.

Table A8. Means, standard deviations, and sample sizes by measure for males and females.

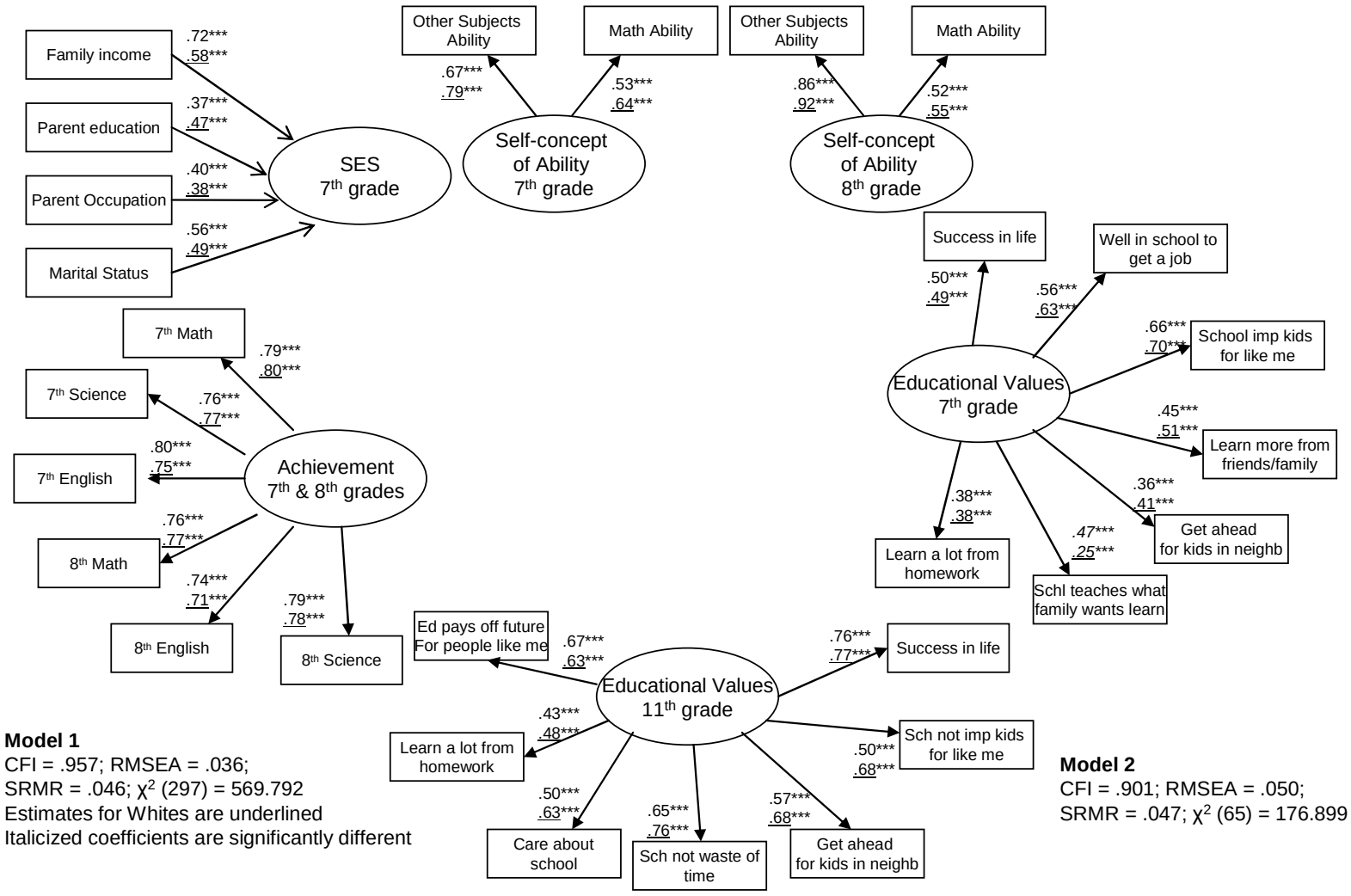
Characteristic	N	Mean	Std Dev	N	Mean	Std Dev	Gender Differences t stat	p value
	Females			Males				
Family income (1= < $5,000; 16= > $75,000)	651	10.04	4.17	668	10.01	4.28	-0.14	0.889
Parent education (years of education)	688	14.50	2.62	716	14.47	2.66	-0.19	0.851
Parent occupational status (0=low; 100=high)	656	72.44	19.53	684	72.76	19.85	0.29	0.769
Marital Status	689	0.68	0.47	716	0.63	0.48	-2.00	0.046 *
African American (0=White; 1=African American)	690	0.64	0.48	717	0.69	0.46	1.70	0.090
Achievement (1= low achievement; 5 = high achievement)								
English (7th grade)	655	3.90	0.91	672	3.32	1.01	-10.85	0.000 ***
Math (7th grade)	655	3.77	0.99	673	3.25	1.07	-9.20	0.000 ***
Science (7th grade)	655	3.93	0.95	673	3.35	1.09	-10.35	0.000 ***
English (8th grade)	572	4.02	0.94	551	3.38	1.04	-10.78	0.000 ***
Math (8th grade)	572	3.66	0.94	551	3.20	1.02	-7.93	0.000 ***
Science (8th grade)	572	3.92	0.91	552	3.43	1.07	-8.18	0.000 ***
Self-concept of ability (not good at all=1; very good=7)								
Math (7th grade)	684	5.22	1.67	703	5.45	1.52	2.67	0.008 **
Other subjects (7th grade)	682	5.60	1.22	701	5.38	1.20	-3.25	0.001 **
Math (8th grade)	487	5.02	1.65	508	5.25	1.55	2.24	0.025 *
Other subjects (8th grade)	487	5.02	1.65	508	5.25	1.55	2.24	0.025 *
Educational expectations (1=11th or less; 8=JD/PhD/MD)								
Expectations (7th grade)	685	6.96	1.77	710	6.68	1.60	-3.10	0.002 **
Expectations (11th grade)	457	6.24	1.54	446	5.53	1.63	-6.75	0.000 ***
Educational values (1=strongly disagree;5=strongly agree)								
7th Grade:								
I have to do well in school if I want to be a success in life.	689	4.53	0.74	705	4.39	0.85	-3.26	0.001 **
Even if do well in school, can't get good job when older.*	689	4.17	0.97	705	3.96	1.10	-3.69	0.000 ***
Schooling is not so important for kids like me.*	687	4.38	0.84	706	4.15	0.98	-4.51	0.000 ***
Learn more from friends and relatives than school.*	688	3.64	1.04	703	3.51	1.07	-2.26	0.024 *
Educ best way to get ahead for kids in my neighbd.	682	4.04	0.94	702	4.04	0.97	0.01	0.994
School teaches me things family wants me to learn	689	3.96	0.83	701	3.94	0.89	-0.51	0.608
I often learn a lot from my homework.	681	3.65	0.93	701	3.54	1.01	-1.96	0.050 *
11th Grade:								
I have to do well in school if I want to be a success in life.	444	4.51	0.81	428	4.08	1.00	-6.99	0.000 ***
Schooling is not so important for kids like me.*	444	4.19	0.98	427	3.91	0.97	-4.24	0.000 ***
Educ best way to get ahead for kids in my neighbd.	444	4.10	0.96	426	3.95	0.96	-2.28	0.023 *
School is a waste of time.	443	4.41	0.83	426	3.97	1.03	-6.93	0.000 ***
I don't really care about school.*	445	4.13	1.03	427	3.78	1.10	-4.77	0.000 ***
I often learn a lot from my homework.	444	3.54	0.95	427	3.21	1.03	-4.92	0.000 ***
Education pays off in future for people like me.	446	4.20	0.85	428	3.94	0.92	-4.36	0.000 ***
Educational attainment (3 yrs post HS)	485	4.81	2.10	361	4.21	2.11	-4.09	0.000 ***

* Indicates that item is coded such that 5=positive educational values.

Appendix B

Measurement model results by
race, parent education, family income-to-needs, and gender

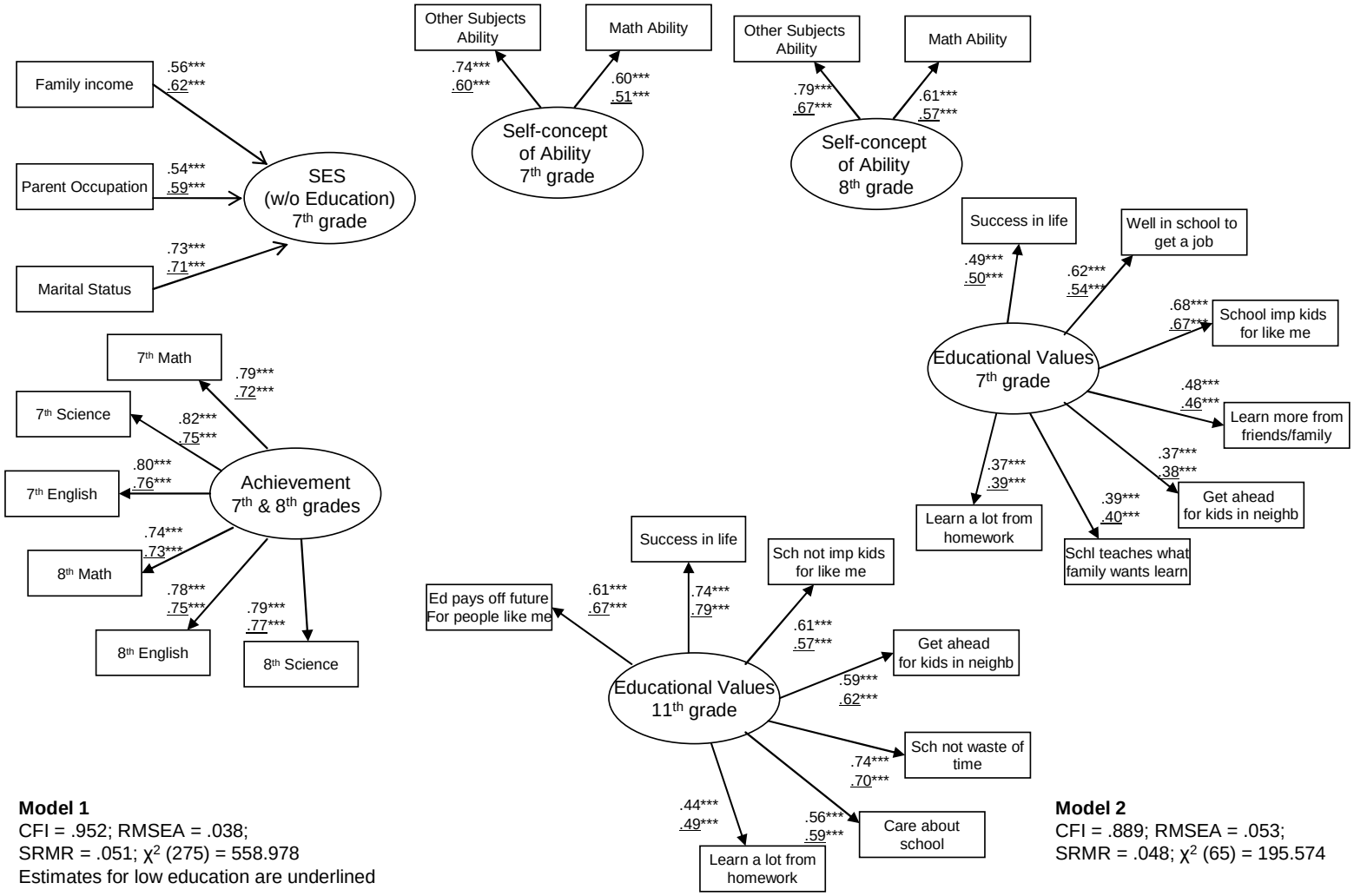
Figure B1. Measurement Model Constrained by Race



Model 1
CFI = .957; RMSEA = .036;
SRMR = .046; χ^2 (297) = 569.792
Estimates for Whites are underlined
Italicized coefficients are significantly different

Model 2
CFI = .901; RMSEA = .050;
SRMR = .047; χ^2 (65) = 176.899

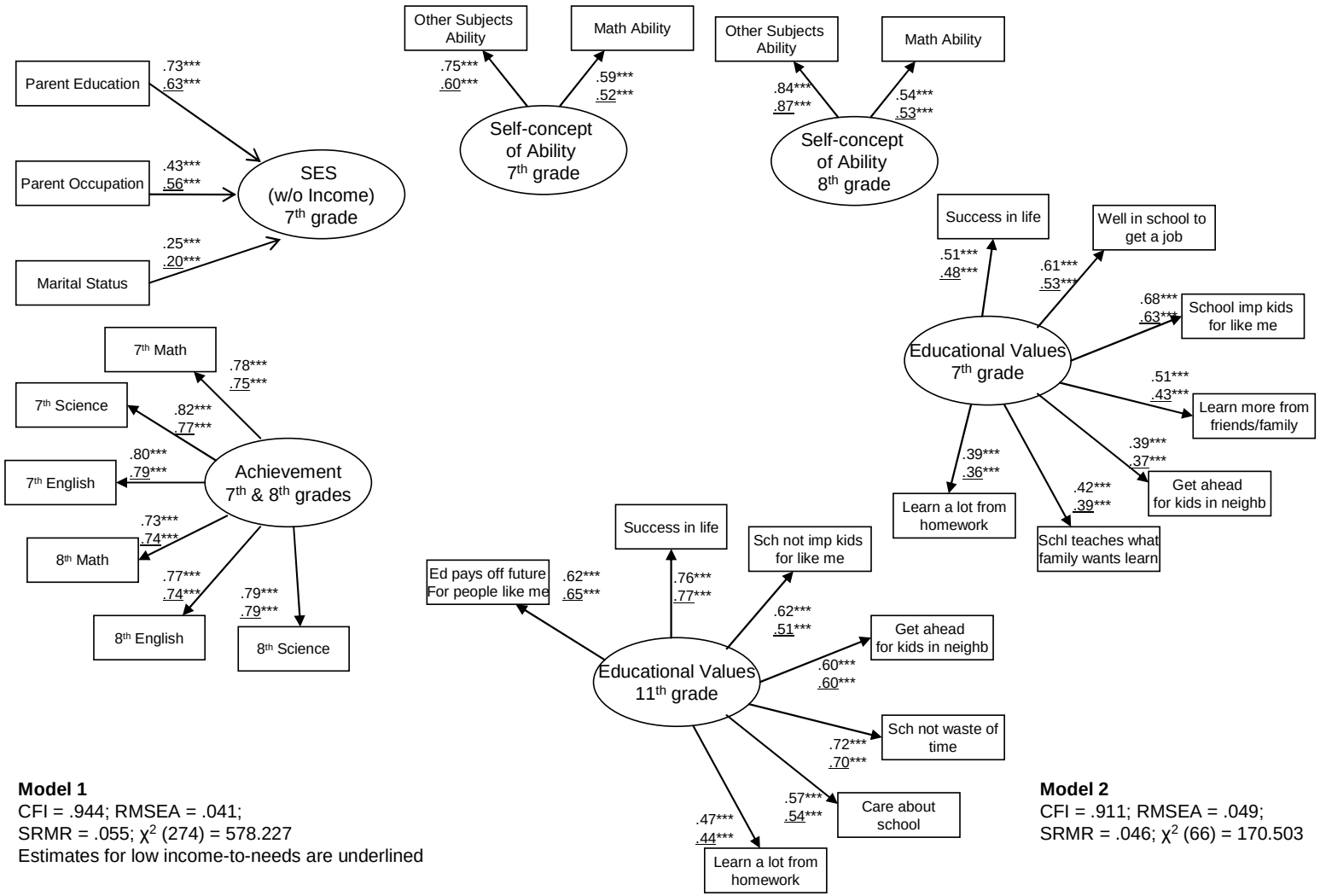
Figure B2. Measurement Model Constrained by Parent Education



Model 1
CFI = .952; RMSEA = .038;
SRMR = .051; χ^2 (275) = 558.978
Estimates for low education are underlined

Model 2
CFI = .889; RMSEA = .053;
SRMR = .048; χ^2 (65) = 195.574

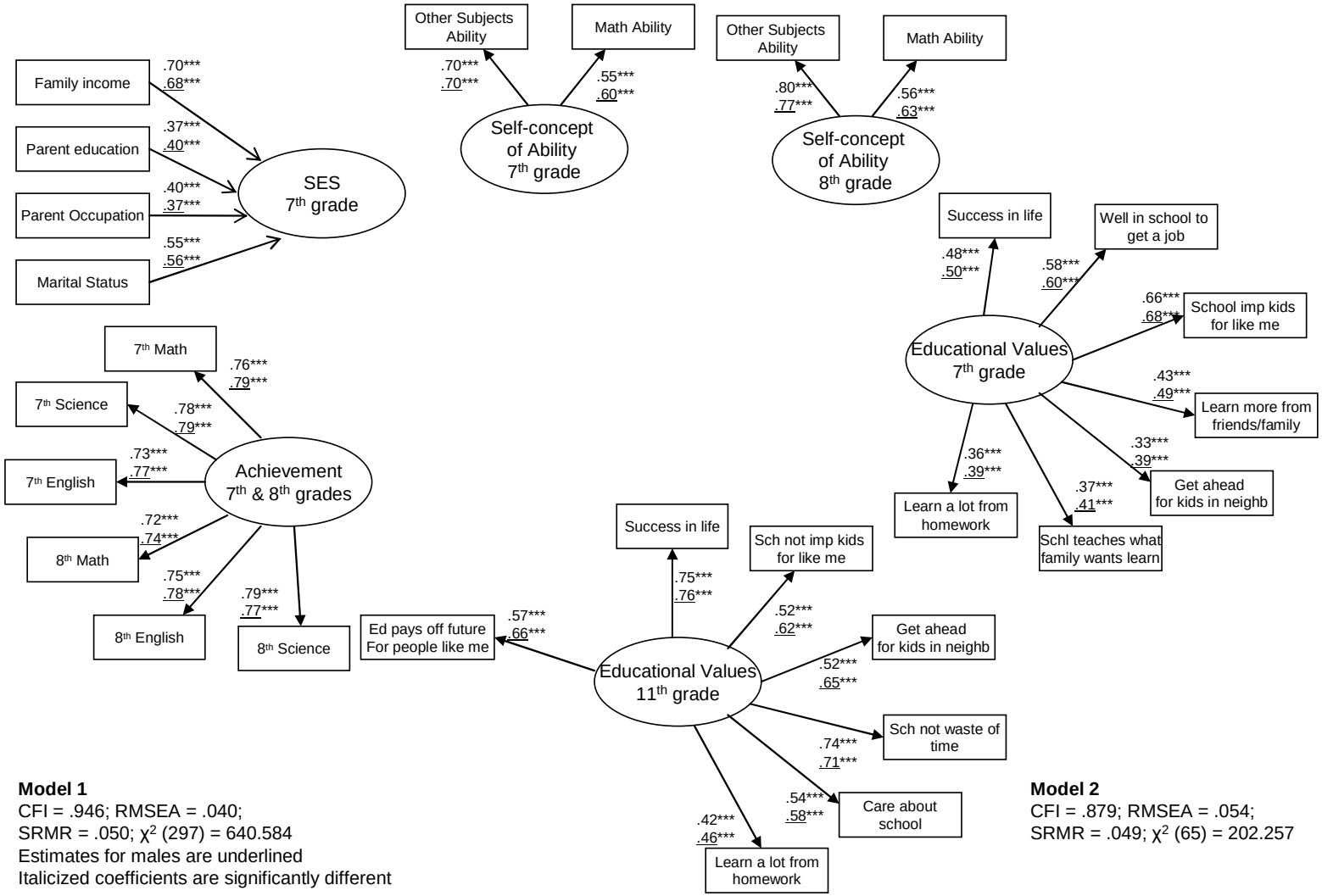
Figure B3. Measurement Model Constrained by Income-to-Needs Ratio



Model 1
CFI = .944; RMSEA = .041;
SRMR = .055; χ^2 (274) = 578.227
Estimates for low income-to-needs are underlined

Model 2
CFI = .911; RMSEA = .049;
SRMR = .046; χ^2 (66) = 170.503

Figure B4. Measurement Model Constrained by Gender



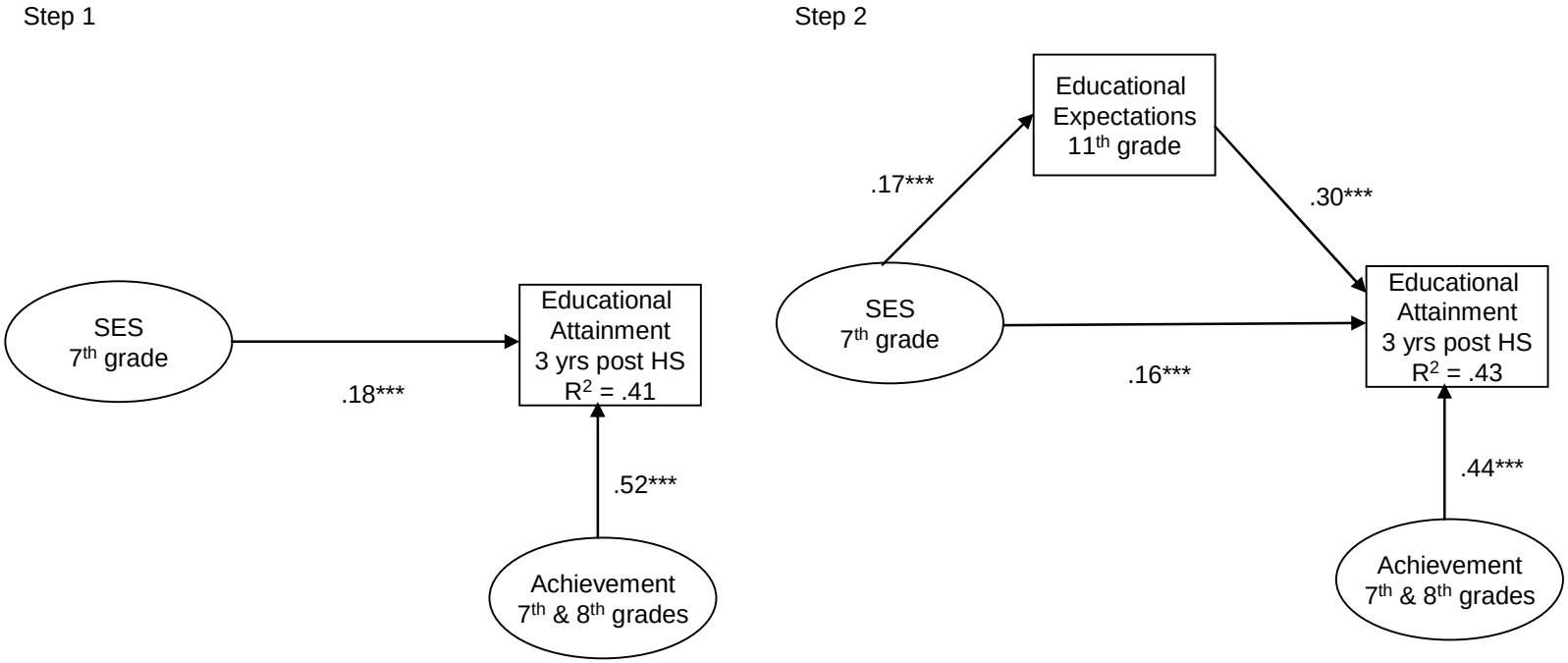
Model 1
CFI = .946; RMSEA = .040;
SRMR = .050; χ^2 (297) = 640.584
Estimates for males are underlined
Italicized coefficients are significantly different

Model 2
CFI = .879; RMSEA = .054;
SRMR = .049; χ^2 (65) = 202.257

Appendix C

Educational expectations as a mediator of the association between SES and educational attainment

Appendix C. Do educational expectations mediate the association between SES and educational attainment?



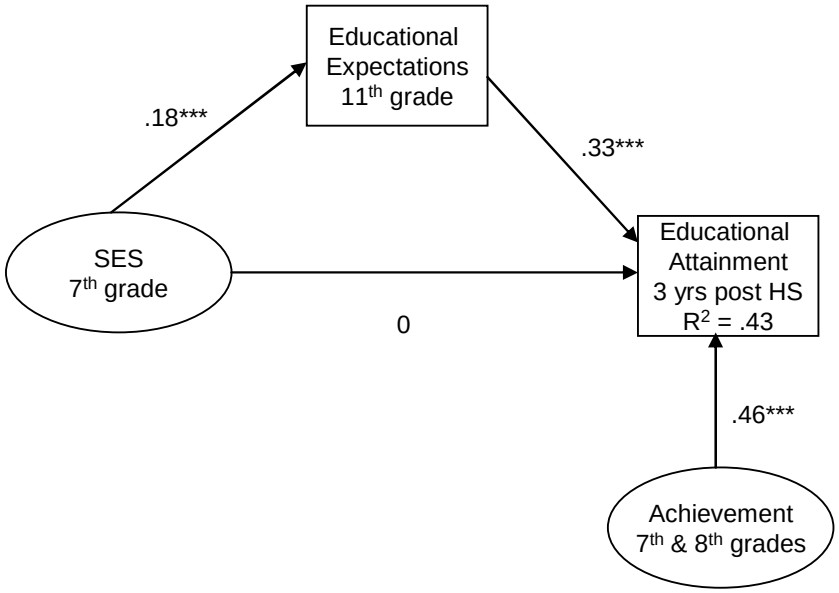
CFI = .971; RMSEA = .039; SRMR = .025; χ^2 (62) = 195.819

CFI = .953; RMSEA = .046; SRMR = .060; χ^2 (82) = 321.708

Note. Standardized estimates are presented above. Covariates for both models include: gender, race, family size, 5th grade ability, 7th grade educational expectations. *** p < .001, ** p < .01, * p< .05, † p < .10

Appendix C. Do educational expectations mediate the association between SES and educational attainment?

Step 3



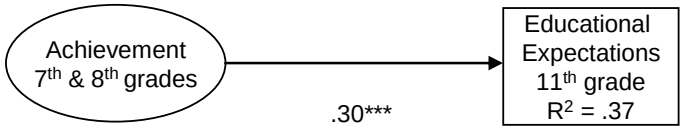
CFI = .948; RMSEA = .047; SRMR = .064; χ^2 (83) = 343.156

Note. Standardized estimates are presented above. Covariates for both models include: gender, race, family size, 5th grade ability, 7th grade educational expectations. *** p < .001, ** p < .01, * p< .05, † p < .10

Appendix D

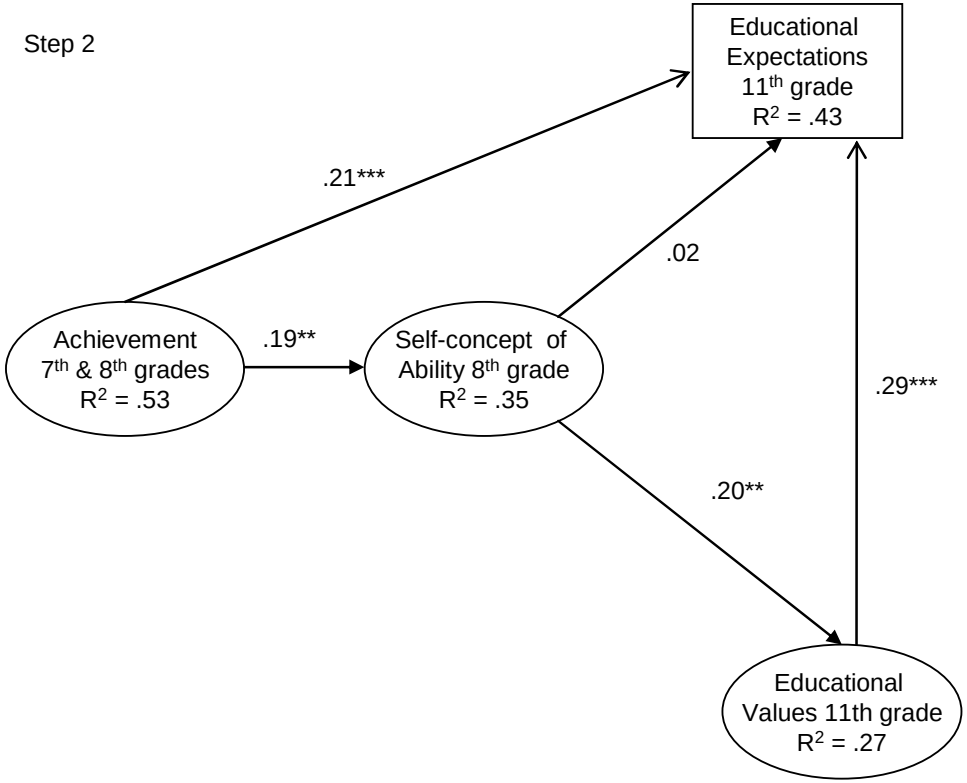
Self-concept of ability and educational values as
mediators of the association between achievement and expectations

Step 1

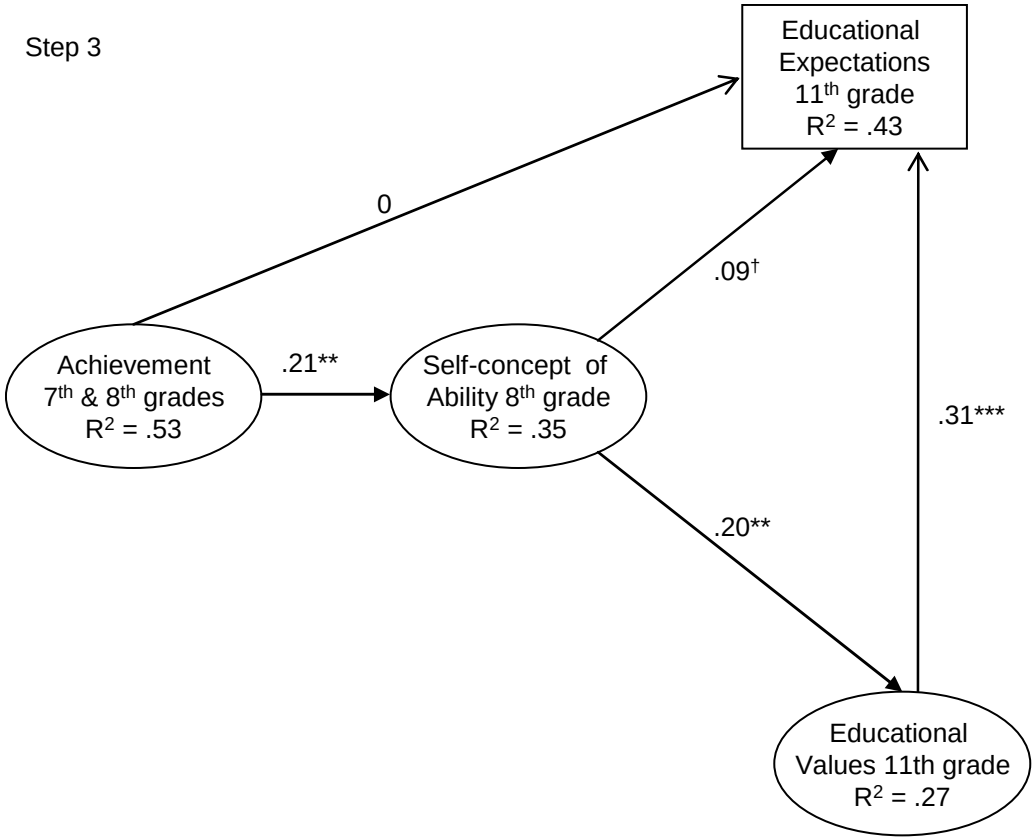


CFI = .962, RMSEA = .044, SRMR = .028, χ^2 (56) = 207.570, p<.0001

Step 2



CFI = .929, RMSEA = .035, SRMR = .043, χ^2 (359) = 981.764, p<.0001

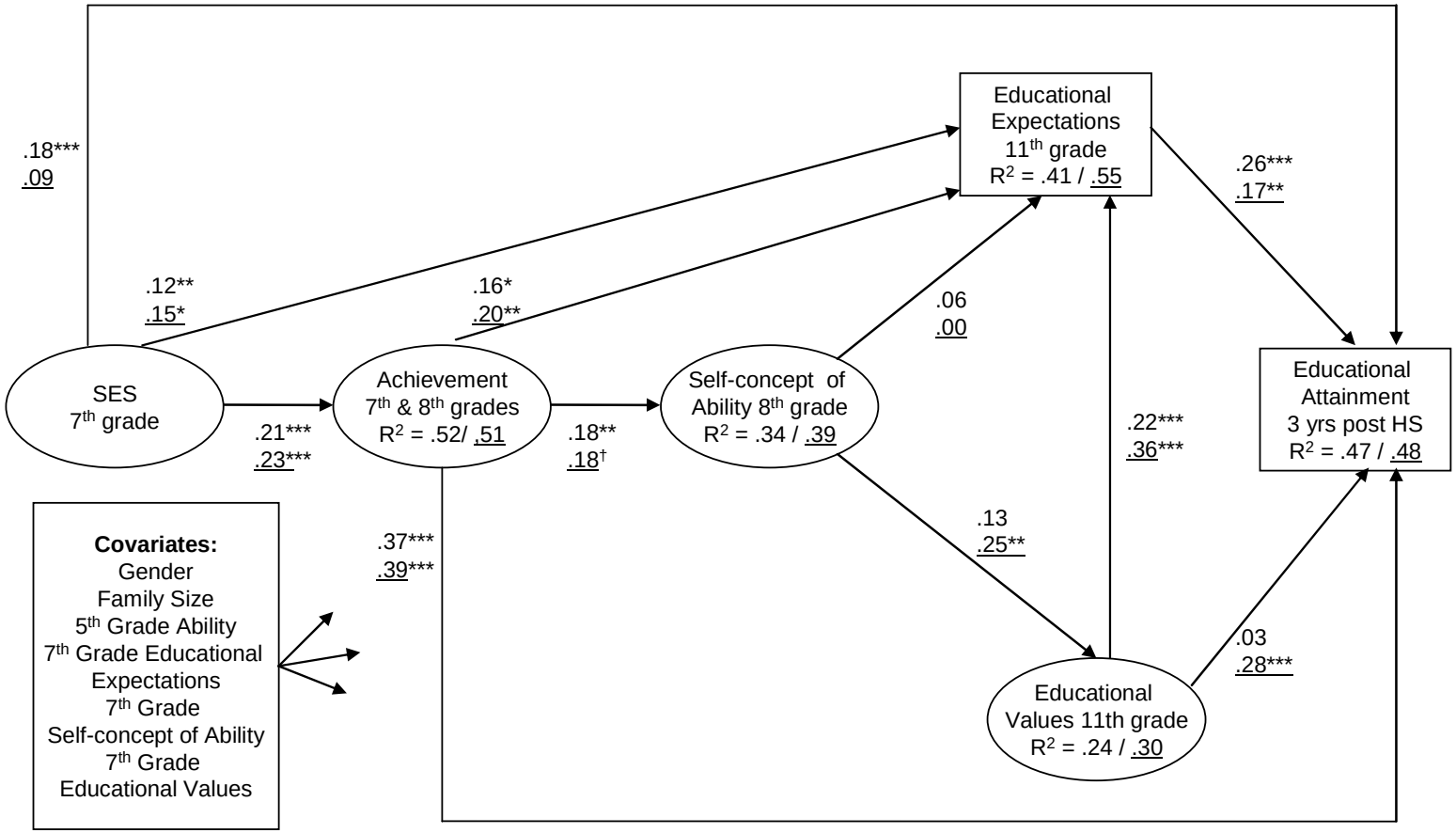


CFI = .927, RMSEA = .036, SRMR = .044, χ^2 (360) = 1000.588, p<.0001

Appendix E

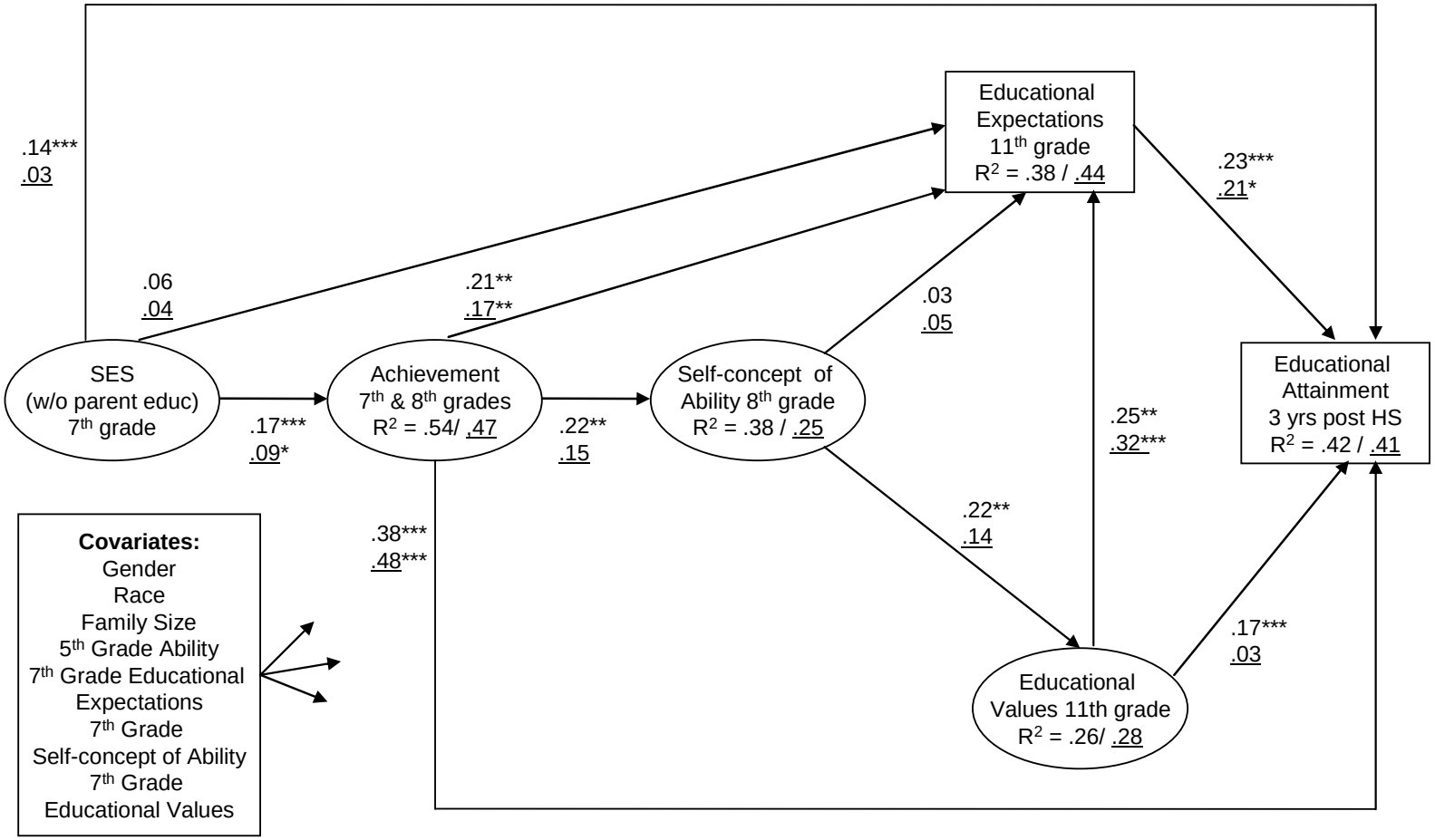
Structural equation models of the
hypothesized model of educational attainment for each subgroup

Figure E1. Individual Models by Race



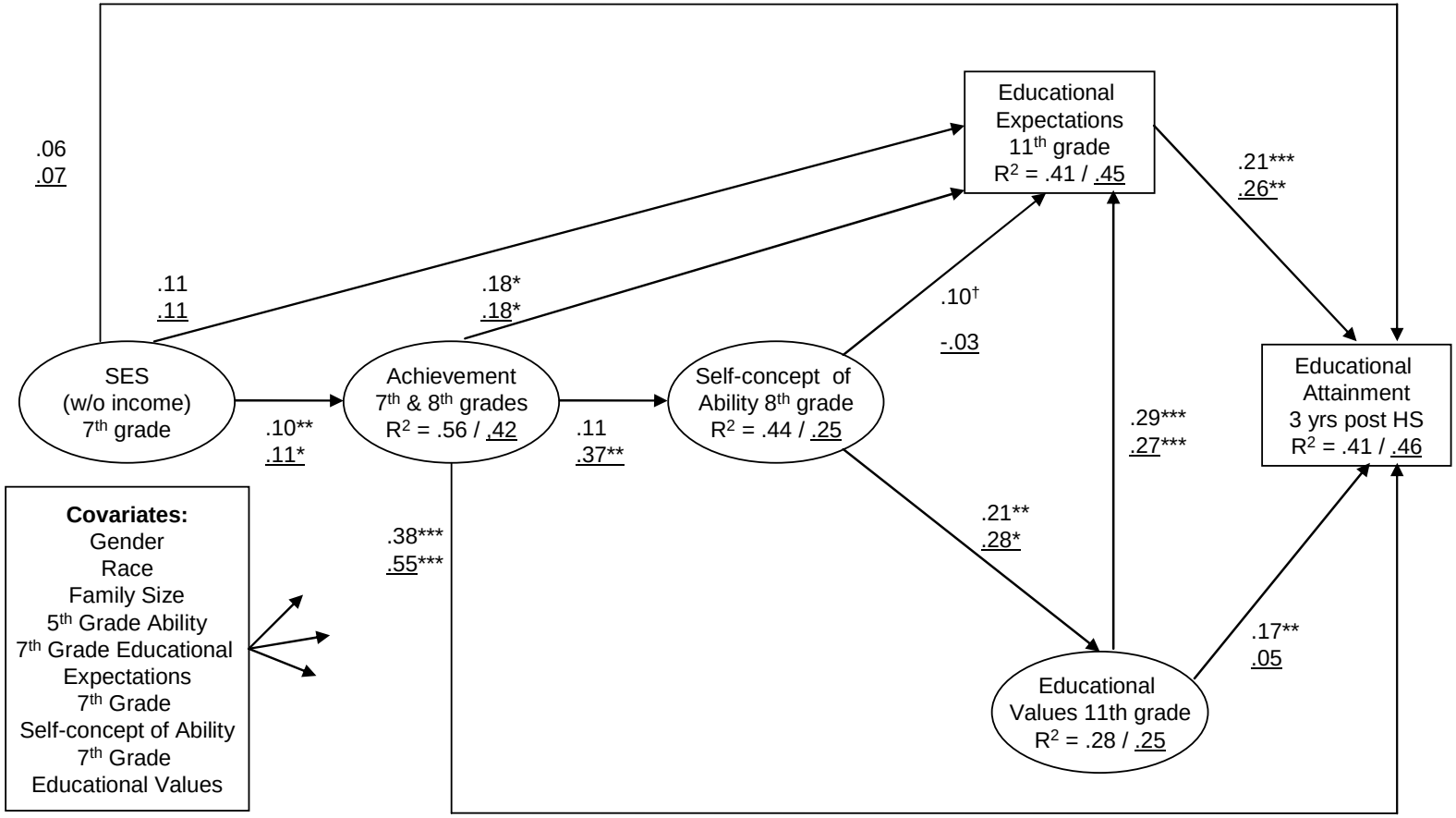
African American: CFI = .937; RMSEA = .031; SRMR = .044; χ^2 (465) = 870.992
White: CFI = .912; RMSEA = .040; SRMR = .056; χ^2 (465) = 810.588
*** p < .001, ** p < .01, * p< .05, † p < .10
Note. Standardized estimates are presented above and estimates for whites are underlined.

Figure E2. Individual Models by Parent Education



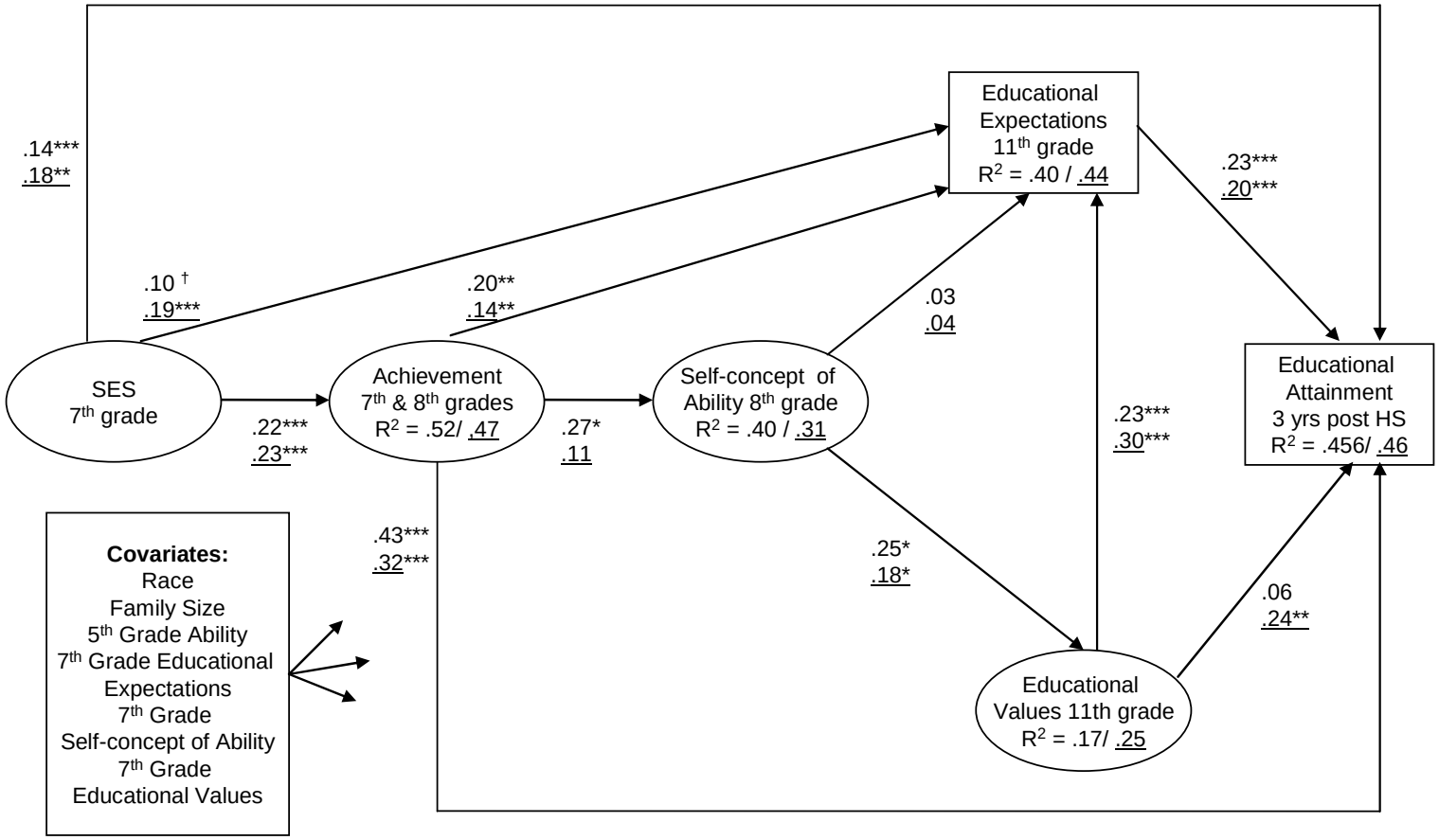
High education: CFI = .934; RMSEA = .032; SRMR = .043; χ^2 (460) = 914.081
Low education: CFI = .909; RMSEA = .035; SRMR = .056; χ^2 (460) = 727.517
*** p < .001, ** p < .01, * p< .05, † p < .10
Note. Standardized estimates are presented above and estimates for the low parent education group are underlined.

Figure E3. Individual Models by Family Income-to-Needs.



High family income-to-needs : CFI = .929; RMSEA = .034; SRMR = .047; χ^2 (460) = 942.935
Low family income-to-needs: CFI = .880; RMSEA = .041; SRMR = .064; χ^2 (460) = 746.086
*** p < .001, ** p < .01, * p< .05, † p < .10
Note. Standardized estimates are presented above and estimates for the low family income-to-needs group are underlined.

Figure E4. Individual Models by Gender.



Females: CFI = .933; RMSEA = .031; SRMR = .047; χ^2 (465) = 782.912
Males: CFI = .919; RMSEA = .036; SRMR = .051; χ^2 (465) = 890.959
*** p < .001, ** p < .01, * p< .05, † p < .10
Note. Standardized estimates are presented above and estimates for males are underlined.

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